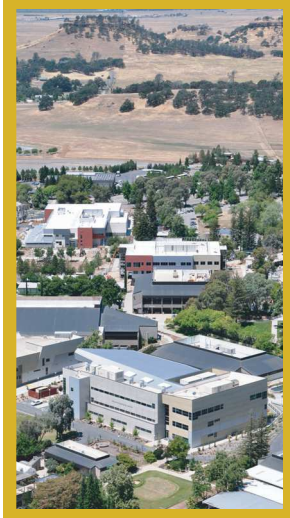
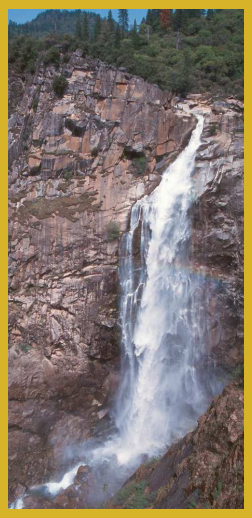
Butte County
CLIMATE ACTION PLAN





ButteCAP.net

Butte County Climate Action Plan

Adopted February 25, 2014

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List of Abbreviations

Abbreviation	Definition
AB	Assembly Bill
BCAG	Butte County Association of Governments
BCAQMD	Butte County Air Quality Management District
CAL FIRE	California Department of Forestry and Fire Protection
CALGreen	California Green Building Standards Code
Cal OES	California Governor's Office of Emergency Services
CAP	Climate Action Plan
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH_4	methane
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
CPUC	California Public Utilities Commission
CSI	California Solar Initiative
EIR	environmental impact report
EV	electric vehicle
FTE	full-time equivalents
GHG	greenhouse gas
GWP	global warming potential
HFC	hydrofluorocarbon
ICLEI	Local Governments for Sustainability
IPCC	Intergovernmental Panel on Climate Change
kW	kilowatt

Abbreviation	Definition
kWh	kilowatt-hour
lbs	pounds
LEED	Leadership in Energy and Environmental Design
LGOP	Local Government Operations Protocol
$MTCO_2e$	metric tons of carbon dioxide equivalents
N_2O	nitrous oxide
OPR	California Governor's Office of Planning and Research
PG&E	Pacific Gas and Electric Company
PV	photovoltaic
RPS	Renewables Portfolio Standard
SB	Senate Bill
SF_6	sulfur hexafluoride
TDM	transportation demand management
UWMP	Urban Water Management Plan
VMT	vehicle miles traveled

Executive Summary

Purpose of the Climate Action Plan

The Butte County Department of Development Services coordinated preparation of this community-wide Climate Action Plan (CAP) for the unincorporated area of Butte County. The CAP is an implementation mechanism of the County's General Plan adopted in 2010 and amended in 2012, providing goals, policies, and programs to reduce greenhouse gas (GHG) emissions, address climate change adaptation, and improve quality of life in the county. The CAP also supports statewide GHG emissions reduction goals identified in Assembly Bill (AB) 32 and Senate Bill (SB) 375. Programs and actions in the CAP will help the county sustain its natural resources, grow efficiently, ensure long-term resiliency to a changing environmental and economic climate, and improve transportation. The CAP and its associated environmental review will also serve as a Qualified GHG Reduction Strategy under the California Environmental Quality Act (CEQA), simplifying development review for new projects that are consistent with the CAP. Ultimately, the County undertook development of this CAP to complete recent efforts initiated in the General Plan to address climate change and protect the local quality of life.

What is the Climate Action Plan?
A plan to help residents and businesses save energy and money
A tool to address climate change in Butte County
A strategy to implement the General Plan and achieve sustainability in unincorporated communities

Building on Local Assets

The County has a long-standing commitment to environmental stewardship. The CAP allows City decision-makers and the broader community to understand the sources and magnitude of local GHG emissions, establish goals to reduce GHG emissions, and prioritize steps to achieve emissions targets. Action steps contained within this CAP build on existing County efforts and leverage partnerships to reduce emissions. This approach allows the County to work effectively, equipping the private sector to undertake innovative projects that are good for business and the environment. Findings in this CAP demonstrate the importance of Butte County's agricultural sector. Not only is agriculture a dominant sector of the economy, but it is also a major leader in early reductions of GHG emissions. Farmers are voluntarily undertaking more efficient practices that are profitable and beneficial to crop yields, reducing the use of fertilizers, conserving water, and replacing inefficient diesel pumps. These practices also have the added benefit of reducing GHG emissions. These business-as-usual efforts of Butte's forward-thinking agricultural entrepreneurs are reducing GHG emissions while supporting the broader economic viability of the region.

Planning Process

The General Plan was the main catalyst for the CAP, but the CAP also builds on the early efforts of County staff. Initiatives have included the work of the Butte County Sustainability Work Team, including an early report on government operations and energy efficiency. In 2004, Butte County also installed a 1-megawatt solar plant at the County Government Center. Working from this platform, the Department of Development Services worked with consultant PMC to prepare the CAP. The process consisted of a review of existing activities, in-depth technical analysis, and a collaborative outreach process with County staff, the general public, and agricultural stakeholders.

Working from these efforts, the CAP establishes objectives, measures, and actions in several key sectors within Butte County. Sectors addressed by the CAP are energy, agriculture, solid waste, transportation, and off-road equipment. The CAP also provides an implementation work plan for County staff and a framework to monitor and demonstrate progress.

Figure ES-1: Climate Action Plan Process

Key Outcomes of the CAP

The CAP presents two main pieces of technical information: (1) a GHG emissions inventory, and (2) calculation of the credit for measures and actions. Using these two sets of information, the CAP estimates the long-term impact of County efforts to reduce GHGs. This approach allows the County to measure progress toward the General Plan target of a 15% reduction in GHG emissions by 2020.

Butte County Community Inventory

The inventory calculates GHG emissions for activities that take place within unincorporated Butte County (hereafter referred to as Butte County) using a "bottom-up" approach. For instance, vehicle trips and kilowatt-hours (kWh) of electricity are multiplied by emissions factors, using formulas that are adjusted for conditions in Butte County. All GHG emissions in the inventory are shown in a common unit: metric tons of carbon dioxide equivalents, or $MTCO_2e$. The GHG emissions inventory analyzes several community sources for unincorporated Butte County in 2006. Of inventoried emissions (911,630 $MTCO_2e$), over three-quarters result from just three sectors: agriculture, on-road transportation, and residential energy use. The 2006 inventory is presented in **Figure ES-2** below.

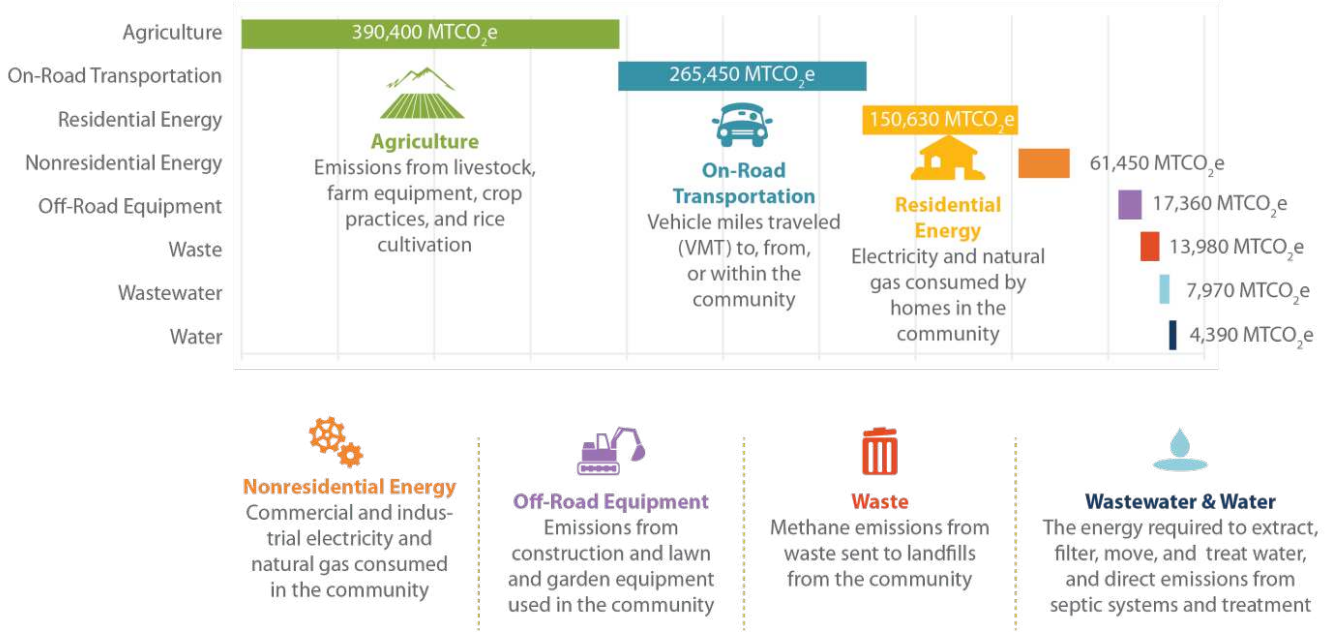
Early County Actions

Adopted new zoning regulations promoting solar and wind energy

Installed a 1-megawatt solar PV system on County facilities

Adopted a General Plan goal to reduce GHG emissions 15% below 2006 levels by 2020

Figure ES-2: 2006 Community Emissions and Sector Explanations


Agriculture
On-Road Transportation
Residential Energy
Nonresidential Energy
Off-Road Equipment
Waste
Wastewater
Water
390,400 MTCO2e
265,450 MTCO2e
150,630 MTCO2e
61,450 MTCO2e
17,360 MTCO2e
13,980 MTCO2e
7,970 MTCO2e
4,390 MTCO2e
Agriculture
Emissions from livestock, farm equipment, crop practices, and rice cultivation
On-Road Transportation
Vehicle miles traveled (VMT) to, from, or within the community
Residential Energy
Electricity and natural gas consumed by homes in the community
Nonresidential Energy
Commercial and industrial electricity and natural gas consumed in the community
Off-Road Equipment
Emissions from construction and lawn and garden equipment used in the community
Waste
Methane emissions from waste sent to landfills from the community
Wastewater & Water
The energy required to extract, filter, move, and treat water, and direct emissions from septic systems and treatment

Although agriculture is the largest sector in the community inventory, when compared acre by acre to urban uses, agriculture is a lower producer of GHG emissions. Agriculture's contribution to the community inventory reflects the large extent of agriculture in Butte County, with over 500,000 acres in some form of agricultural production. In 2006, agricultural practices emitted less than 1 $MTCO_2e$ per acre of existing agricultural land. In comparison, when looking at total existing residential and nonresidential acreage, average energy use resulted in more than 6 $MTCO_2e$ per acre. These results indicate that each average acre of new residential, commercial, or industrial land could result in emissions of up to nine times that of an acre of agricultural land. This information focuses solely on inventoried sectors in the Butte community inventory that are easily allocated to land use types. But in general, agricultural land can be up to 100 times less intensive than urban land when accounting for all inventory emissions.

Within agriculture, different crop practices also yield different emissions. Certain agricultural practices such as fertilizer use occur across many crop types, but are unable to be allocated by crop due to limited public data. Several key agricultural GHG emissions intensities calculated from the inventory include:

- 1.1 $MTCO_2e$/acre: methane emissions from rice per acre of rice field
- 0.7 $MTCO_2e$/acre: total agricultural emissions per acre of agricultural land (any type)
- 0.4 $MTCO_2e$/acre: orchard residue burn emissions/acre of harvested orchard

Although general approximations, these comparisons highlight agriculture's relative efficiency of GHG emissions.

Climate Action Plan Results

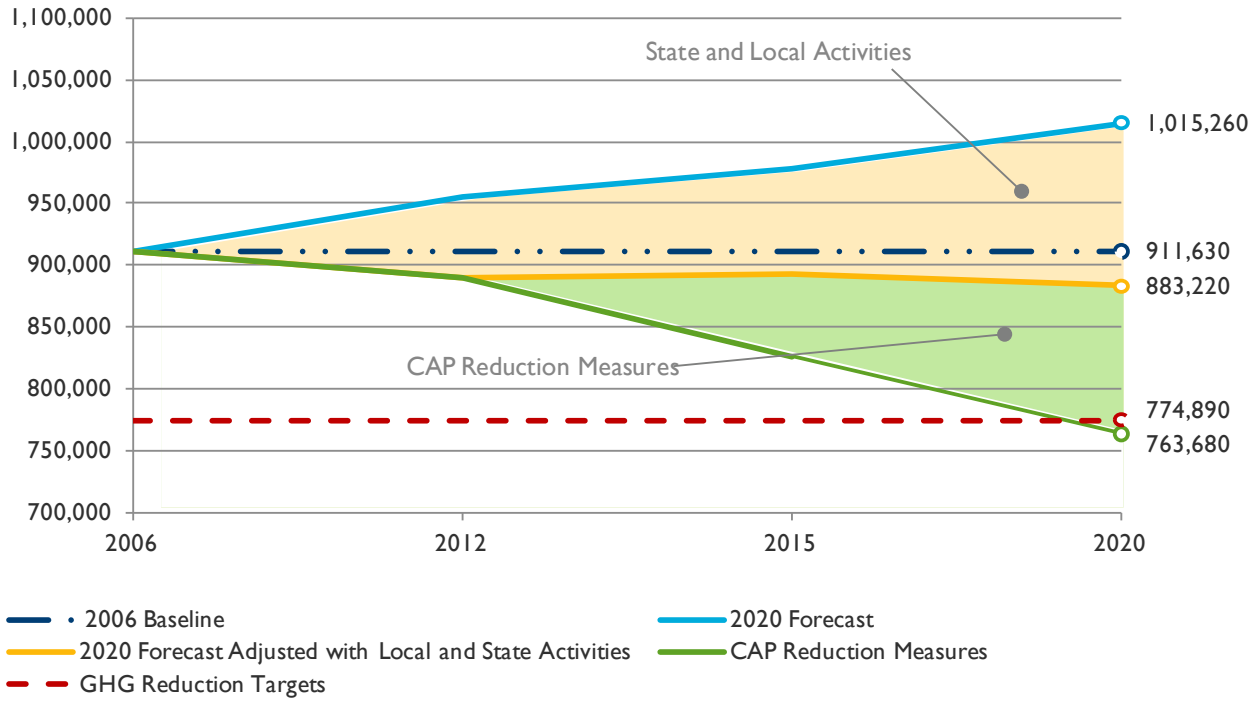
Strategies to reduce GHG emissions build on inventory results and key opportunities prioritized by County staff, agricultural stakeholders, and the public engagement process. Full implementation of the CAP can reduce emissions by up to 16.2% below baseline 2006 levels by 2020, exceeding the General Plan goal and state guidance for reductions. The majority of reductions will be achieved through the County's efforts to streamline solar PV projects and the ongoing optimization of agricultural practices.

The strategies in the CAP consist of measures and actions, identifying the steps the County will take to support reductions in GHG emissions. The County will achieve these reductions in GHG emissions through a mix of voluntary programs and new strategic standards. All recommended standards presented in this CAP respond to the needs of development, avoiding unnecessary regulation, streamlining new development, and achieving the more efficient use of resources. The reductions achieved by the CAP in 2020 are presented in **Figure ES-3** below.

GHGs: A Snapshot of Local Activity

The inventory calculates GHG emissions for activities that take place within unincorporated Butte County using a "bottom-up" approach. For instance, vehicle trips and kWh of electricity are multiplied by emissions factors, using formulas that are adjusted for conditions in Butte County. All GHG emissions in the inventory are shown in a common unit: metric tons of carbon dioxide equivalents, $MTCO_2e$.

Figure ES-3: 2020 CAP Reductions



Climate Action Plan Benefits

The CAP provides a framework for the County to reduce GHG emissions while simplifying the review process for new development. Measures and actions in the CAP identify the County's expectations for new development. This approach allows the CAP to serve as the County's resource for GHG analysis and mitigation pursuant to CEQA.

County staff will also use the CAP as an important tool to implement the General Plan's goal of a 15% reduction in GHG emissions by 2020. The work plan contained in the CAP identifies the responsibility of key departments, time frames, and processes to complete annual updates to the Board of Supervisors. The CAP will function as a dynamic tool, equipping County staff to undertake near-term steps toward long-term General Plan objectives. However, the County can only achieve the goals established in this CAP through community partnerships. As a result, the CAP is also a resource for the community, identifying the County's intent to use creative collaborative partnerships to leverage resources and work efficiently. Information in the CAP also highlights the important contribution of the agricultural sector, providing an example of cost-effective environmental stewardship.

Climate change is expected to influence existing hazards and vulnerabilities. While anticipating consequences of a changing climate is a challenging task, the work plan prioritizes actions for the County to adopt to protect resources and prepare for changing precipitation patterns, reduced water supply, and increased hazards such as flooding, heat waves, and wildfire. Measures in the CAP and proactive steps will help the County achieve the General Plan vision of thriving communities, a strong agricultural base, and healthy natural resources.

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Introduction

CHAPTER 1

What Is This Plan?

Butte County (County) recognizes a compelling need for a local approach to reduce greenhouse gas (GHG) emissions within the community and from government operations that contribute to global climate change. General Plan Policy COS-A1.1 directs the County to "develop a Climate Action Plan, which, in combination with other existing policies and regulations by other agencies and business sectors of the economy, would achieve reduction consistent with State guidelines using methodology deemed appropriate at the time of quantification."

This Climate Action Plan (CAP) is a strategic plan that implements direction established by the Board of Supervisors in the General Plan and reduces emissions in a manner consistent with California guidelines and regulations. The CAP describes cost-effective opportunities for the agricultural community, existing and future residents, businesses, and development projects to continue to make Butte County a more sustainable community and ways to increase economic, social, and environmental resiliency under a changing climate. The CAP may also simplify future environmental review of development projects under the California

Environmental Quality Act (CEQA). Together, the measures and actions established in the CAP will simplify development review; provide greater consistency between County agriculture, sustainability, and renewable energy programs; and set a work program for the County to achieve adopted General Plan goals and policies related to climate change.

The County has a long-standing commitment to protect the environment and promote sustainable economic development and agriculture. The County has already taken many steps to reduce GHG emissions. Within this context, the CAP identifies how current County policies and actions and steps the County will take in the future can achieve a state-recommended GHG emissions reduction target of 15% below 2006 levels by 2020. It provides emissions reduction measures and actions for agriculture, energy use, transportation, land use, water, solid waste, and off-road equipment that will reinforce, build upon, and sustain these policies and programs.

The success of this plan will rely on collaborative and dynamic partnerships with the private sector, community groups, trade associations, and other stakeholders. With this CAP, the County seeks to protect the unique aspects that draw residents and businesses to the area, while strengthening programs that improve quality of life and reduce emissions.

Introduction to Butte County

Located in Northern California, unincorporated Butte County contains approximately 1,680 square miles within the northeastern end of the Sacramento Valley, extending east into the northern Sierra Nevada foothills. Butte County is predominantly a rural area; urban land makes up less than 5% of the total county area. Weather is generally temperate and warm, with average lows dropping to just below 40 degrees Fahrenheit and summer highs ranging over 90 degrees Fahrenheit.[1]

Homes and businesses are dispersed throughout the unincorporated county, resulting in transportation activity typical for a rural, unincorporated county. Given the distribution of homes, businesses, and daily activities, driving in personal vehicles is common. Most of the building stock was constructed before adoption of California's energy-efficient Title 24 building code in 1978. Similar to other rural counties, Butte County does not require a business license or maintain extensive building stock records.

Agriculture is a strong and growing sector of the Butte County economy, and occupied about 500,000 acres of unincorporated county land in 2012. According to the Agriculture Commission office, gross Butte County 2012 agricultural production totaled $721,434,000, an increase of over $77.3 million above 2011, and approximately 45% above the county's 10-year average.[2] Walnuts, almonds, and rice crops were among the highest-value crop types. Generally, agricultural activity has been shifting from field crops to higher-value nut crops that typically require less water and fertilizer. Agricultural businesses have taken steps to reduce costs and improve yields by reducing water and fertilizer use, both of which have GHG emissions reduction benefits. Agricultural innovation is a key foundation of the County's economic strategy, and is also important to the success of the CAP.

[1] Butte County. 2007. General Plan Setting & Trends Report Public Draft.

[2] Butte County Agriculture Commission. 2013. Butte County 2012 Crop Report.

Butte County Department of Development Services

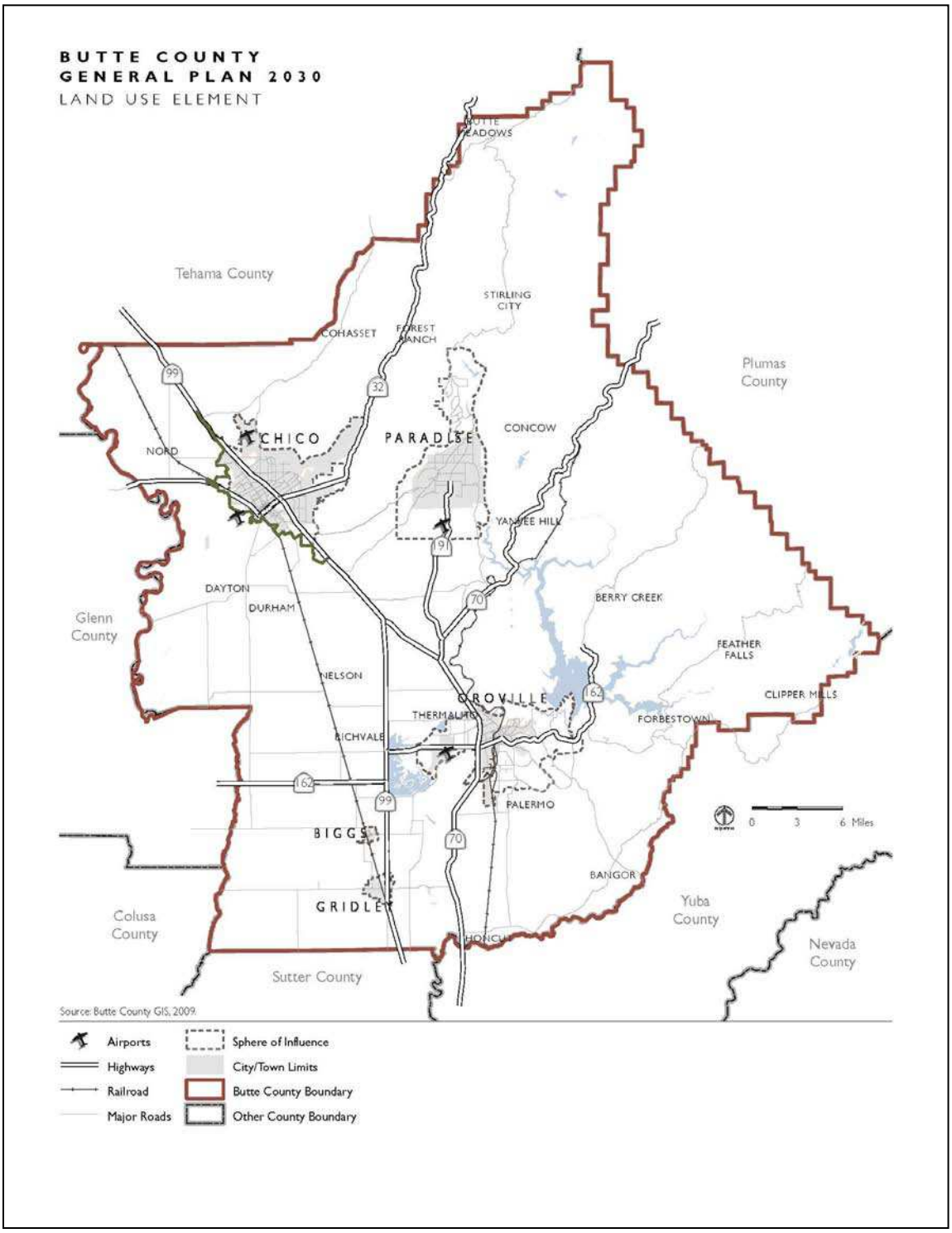
The Butte County Department of Development Services (DDS) led preparation of this CAP with assistance from several other County departments to follow direction established within the General Plan. The DDS (comprising the Building, Code Enforcement, and Planning divisions) is the County agency responsible for implementing the General Plan within unincorporated Butte County, working to achieve orderly development consistent with the County's long-term goals. The DDS administers development-related actions while enhancing public understanding of land use and development laws and procedures. DDS staff will assume primary responsibility for coordinating the programs and actions identified in the CAP.

Where this Plan Applies

The CAP provides GHG emissions reduction targets for both the unincorporated Butte County community, and for Butte County government operations. **Figure 1** identifies the jurisdictional boundary of Butte County, which includes the cities of Biggs, Chico, Gridley, and Oroville, and the Town of Paradise. Butte County provides many services on a countywide basis, but has land use authority only over the unincorporated area, which is the focus of the CAP. The term "community" is used to refer to the unincorporated area.

The CAP also addresses Butte County government operations and facilities in both incorporated and unincorporated areas. Government operations emissions are distinct from community emissions, and the two topics have different GHG emissions reduction targets.

Figure 1: Unincorporated Butte County



Regional Partnerships

The primary intent of the CAP is to reduce emissions in unincorporated Butte County through ongoing partnerships with other agencies and community groups. Butte County will work with the cities of Biggs, Chico, Gridley, and Oroville, and the Town of Paradise, along with the Butte County Association of Governments (BCAG) and the Butte County Air Quality Management District (BCAQMD). Ongoing collaboration and support will allow the County to effectively use existing resources and leverage funding toward common interests. The County will also engage Pacific Gas and Electric Company (PG&E), agricultural industry groups, and nonprofit institutions. The Institute for Sustainable Development at California State University, Chico is another partner working toward regional sustainability that can provide ongoing support to the County as it develops and monitors CAP programs. The County's plan to engage these and other stakeholders is further discussed in **Chapter 4**.

Why Butte County Developed This Plan

County General Plan Vision and Goals

The County has developed this CAP to implement policy direction established by the Board of Supervisors in the 2030 General Plan. Conservation and Open Space Element Goal COS-1 directs the County to reduce GHG emissions to 1990 levels by 2020. The General Plan also commits the County to prepare a CAP to achieve these emissions levels, and to set emissions reduction goals for future years beyond 2020.

Before adopting the General Plan, County staff conducted extensive public outreach to shape a long-term vision and priorities. This engagement process focused the General Plan on strategies to reduce emissions, protect resources, and enhance the environment, while improving local quality of life. The CAP builds on these early efforts, completing General Plan tasks that reflect community priorities.

Resilience to Climate Change

Long-term protection of natural resources and communities is a central theme of the General Plan. To ensure that natural and human systems can continue to thrive, the County must anticipate changing climatic conditions relative to existing hazards and risk exposure. Even if global GHG emissions ceased immediately, existing local hazards and vulnerabilities would be exacerbated by climate change. Local hazards that will be affected by climate change include greater frequency of extreme heat events, increased wildfire hazard and risk, more frequent and damaging floods, reduced water supply, and increased risks to local ecosystems and crops. The County is already addressing these challenges, but must be prepared to respond to changing risks by modifying some operational practices and strengthening the capacity of County resources to respond. Through upfront planning, the County can reduce both exposure to risks and long-term costs for responding to disasters. **Chapter 5** of this plan further discusses these issues, outlining steps the County can take to improve existing hazard mitigation practices and adjust to long-term gradual changes expected with climate change.

Priority Issues in Butte County

The General Plan prioritizes natural resource protection, including open spaces, agricultural, and biological and ecological resources. The County's vision values these resources while encouraging compact development supporting housing, employment, recreation, and agriculture. CAP measures and actions reduce GHG emissions, but can also help the County sustain natural resources, grow efficiently, and improve long-term resiliency to changing environmental and economic conditions.

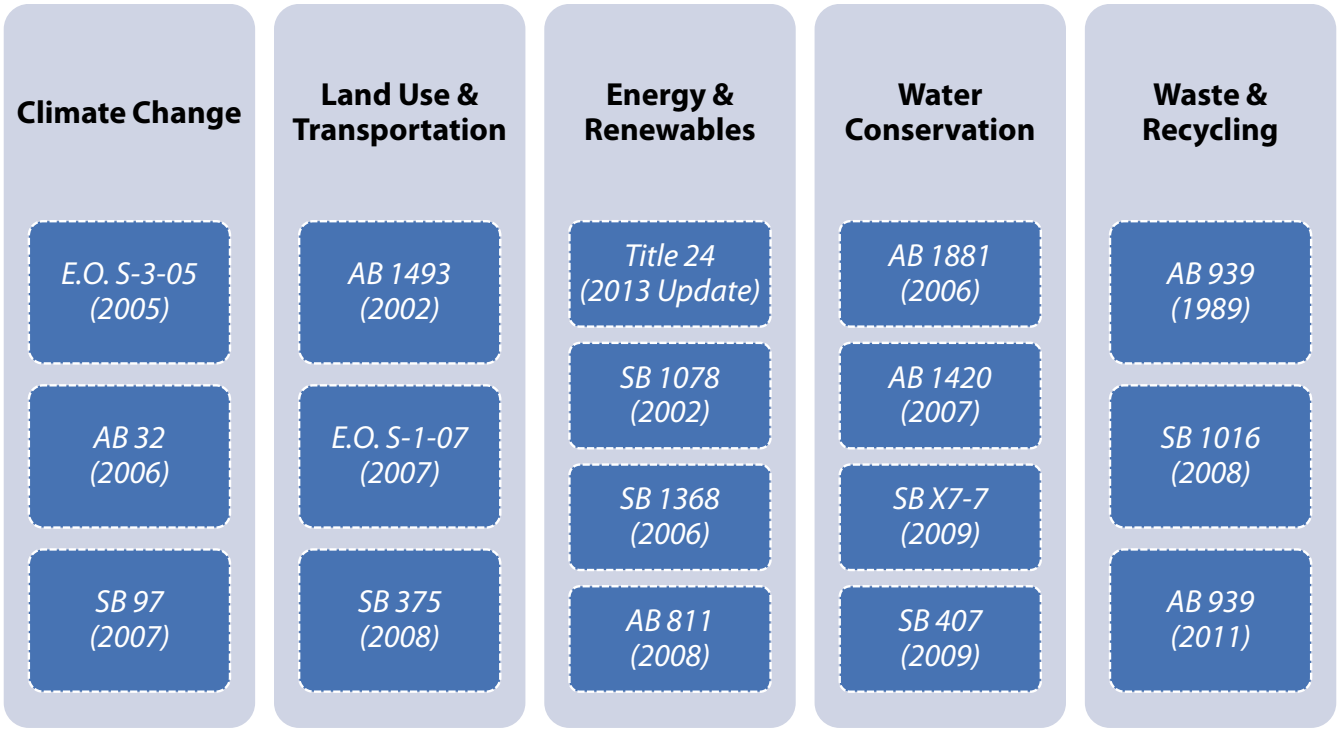
General Plan transportation and land use policies are already reducing GHG emissions throughout the county. **Chapter 3** describes the positive benefits of these policies. The following sections of the CAP analyze and describe further direction and provide cost-effective options to reduce GHG emissions and improve the quality of life in Butte County consistent with the General Plan. County staff, farmers, and businesses are already conducting day-to-day practices that make good business sense and reduce GHG emissions. Drawing on this practical innovation, the CAP shows how the County will further spur GHG reductions while supporting business and farm success.

Additional priorities emerged during the development of the CAP. Most of Butte County's building stock was constructed prior to adoption of California's progressive energy-efficient building standards in the late 1970s. Due to the characteristics of this older building stock, many buildings are old enough to benefit from measures that improve habitability and reduce energy use. The County's approach to support energy efficiency is to leverage collaborative partnerships with existing community groups, trade associations, and other stakeholders. This approach, where the DDS has focused on the private sector, has been prioritized as more effective for Butte County than an extensive permitting process and unnecessary regulations.

California Regulatory Framework

State Assembly Bill (AB) 32 (2006), the Global Warming Solutions Act, directs public agencies in California to support the statewide goal of reducing GHG emissions to 1990 levels by 2020. Preparing a CAP supports AB 32 at the local level by providing a policy framework to reduce emissions. While complying with AB 32 is not a direct requirement for local jurisdictions, demonstrating consistency with statewide reduction goals can help Butte County qualify for incentives such as grant funding. State efforts to address climate change, reduce resource consumption, and improve energy efficiency are identified in **Figure 2**.

Figure 2: Regulatory Framework for Climate Change



How Butte County Developed This Plan

Planning Process

The County developed this CAP using an iterative five-step process illustrated in **Figure 3**. **Chapters 2, 3, 4,** and **6** fulfill steps one through three and provide a structure to complete steps four and five. Step five is essential to a successful CAP as it is the point when the City estimates the effectiveness of the CAP and determines if additional measures are needed.

The County led a collaborative process throughout development of the CAP. Opportunities for public participation included a community workshop, mobile booth at the Butte County Fair, stakeholder focus group meetings, and updates to the Planning Commission and Board of Supervisors. These focused efforts built upon a broader-based General Plan outreach process. As the unincorporated county encompasses a diverse geography and range of communities, the County recognizes that ongoing public involvement is critical to develop a plan that responds to community priorities and to build and nurture partnerships necessary to implement it.

Figure 3: Five-Step Climate Action Planning Process[3]

1. Inventory Emissions
2. Establish a Reduction Target
3. Adopt Measures to Achieve Target
4. Implement Reduction Measures & Adaptation Strategies
5. Evaluate Progress

County Government Staff

Several County departments participated in strategy development for this CAP through in-person focus meetings and ongoing review of the project. While DDS facilitated the project, other departments provided support reviewing existing programs, identifying effective opportunities to reduce emissions through existing practices, and analyzing the feasibility of proposed measures. The County's collaborative process has resulted in a practical, comprehensive strategy that outlines County steps to reduce emissions.

[3]See ICLEI's Five Milestones for Climate Mitigation (http://www.icleiusa.org/action-center/getting-started/iclei2019s-five-milestones-for-climate-protection)

Community Engagement

The County engaged community members in a variety of ways, including workshops, stakeholder meetings, a project website, and public hearings. These events provided a forum for community members to voice ideas about how to reduce emissions and to make Butte County a more sustainable place to live and work.

- **March 20 and August 5, 2013, Agricultural Stakeholder Events.** Due to the importance of agriculture both to the County's economy and local emissions reduction strategies, the County held two focused meetings with Butte County Farm Bureau representatives and the Agriculture Commission office to identify opportunities, review data, and prioritize proposed measures and actions.
- **May 14, 2013, Community Open House.** Butte County hosted a CAP community open house at Lakeside Pavilion in Chico. Upon arrival, participants were invited to start reviewing the open house displays. County, BCAQMD, and City of Chico staff and consultants gave presentations about the project. After the presentations, attendees provided input at six open house activity stations. Approximately 30 people attended the open house.

May 14, 2013, open house presentation by Tim Snellings, DDS director

As part of the workshop, attendees participated in electronic polling. Themes that emerged from the workshop included strong support for renewable energy generation in the county, moderate support for increased use of electric vehicles, and a desire to achieve GHG reduction targets largely through incentivized or voluntary approaches.

- **August 22–25, 2013, "Pop-Up" Workshop at Butte County Fair.** The County hosted a booth at the Butte County Fair dedicated to the CAP. Posters and activities at the booth invited participants to learn about the project, review the County's preliminary policy direction for the CAP, and provide feedback. The goal of this outreach effort was to determine if preliminary policy directions selected by the County aligned with community priorities. The fair booth was also a way to reach a varied audience that may not have had the time or ability to attend the May 14 community open house.

August 22–25, 2013, "Pop-Up" Workshop at Butte County Fair

How Butte County Will Implement This Plan

County Planning and Decision-Making Process

Following adoption, the CAP will be the County's primary tool to implement General Plan goals to reduce GHG emissions. CAP actions will be integrated within County processes, trigger ordinance updates, and initiate policy and procedure revisions. Departments will consider the CAP when preparing annual work plans. DDS will lead implementation of the CAP in coordination with other departments, support integration of the CAP into County operations, and review future projects for consistency with CAP measures and actions.

How to Use This Plan

The CAP has been prepared to be accessible to and useful for a variety of stakeholders. It can be used as a work plan by County staff, an informational resource for property owners, and a way to engage interested partners and stakeholders. It is primarily a tool to identify the County's plan to reduce GHG emissions and adapt to climate change locally. However, the County will only achieve the goals of this CAP through community partnerships. Members of the public can use the CAP to identify programs and opportunities or learn about local conditions and priorities.

CEQA Streamlining

The CAP provides a framework for the County to reduce community-wide GHG emissions, to simplify the environmental review process for new development, and to review and process projects in a timely and more predictable manner.

Most large new development projects must undergo a lengthy CEQA review process to analyze and disclose potential environmental impacts. New projects that the County considers to be consistent with the CAP can avoid analyzing specific impacts on climate change, although these projects may still be required to analyze other potential environmental impacts in a negative declaration, mitigated negative declaration, or environmental impact report. By identifying a menu of measures in this CAP, the County is providing applicants with a recommended list of ways to reduce GHG emissions, reducing the workload for project applicants. Applicants can incorporate CAP measures within proposed projects, knowing that they meet the County's expectations.

The Butte County CAP and accompanying environmental documentation provide these benefits based on consistency with State CEQA Guidelines Section 15183.5(b)(1). County staff will use a project checklist to analyze the consistency of new projects subject to CEQA with applicable CAP measures.

Emissions in Butte County

CHAPTER 2

Butte County Landfill-Gas-to-Energy Project

A greenhouse gas (GHG) emissions inventory and forecast lay the groundwork for the CAP planning process. This chapter provides an inventory and GHG forecasts for the unincorporated community as well as for government operations. These inventories use calendar year 2006 data from everyday activities such as the electricity used in homes, miles traveled in vehicles, and natural gas used in government facilities to estimate GHG emissions. The 2006 baseline year has been selected for consistency with state guidance and the General Plan. This chapter also describes projected emissions levels for the community and government operations for 2020 and 2030. Consistent with state guidance and General Plan requirements, the County has identified emissions reduction targets for the forecast years (see **Chapter 3**). Please refer to **Appendix B** for additional detail and description of methods used to complete the inventory.

Methods and Emissions Sources

This inventory was prepared using protocols and best practices identified within the Local Government Operations Protocol (LGOP) v. 1.1[4] and the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions. The inventory analyzes the following community and government operations emissions sources[5]:

Community Emissions

- Agriculture – Emissions from fertilizer and agricultural off-road equipment/vehicles
- Transportation – Vehicle miles traveled (VMT) to, from, or within the community
- Residential energy – Residential electricity, natural gas, and propane consumed
- Nonresidential energy – Commercial and industrial electricity and natural gas consumed
- Off-road equipment and vehicles – Emissions from construction and from lawn and garden equipment
- Solid waste – Methane emissions from waste sent to the landfill from the unincorporated area
- Wastewater – Energy required to treat and move wastewater and direct emissions from septic tanks
- Water – Energy required to extract, move, and/or treat ground and surface water

Excluded Community Emissions Sectors

Two primary sectors are excluded from community emissions due to the County's lack of jurisdictional control:

- *Forestry, including emissions generated by heavy equipment and logging trucks associated with land devoted to timber production.*
- *Stationary source emissions, including stationary fuel use at facilities permitted by the Butte County Air Quality Management District (BCAQMD).*

Government Operations Emissions

- Building energy – Electricity and natural gas consumed at County facilities
- Lighting – Pacific Gas and Electric (PG&E)-owned streetlights, County-owned streetlights, and County-owned traffic lights and controllers
- Water and wastewater – Electricity used to treat and deliver potable water and to transport and treat wastewater
- Vehicle fleet – Gasoline- and diesel-fueled vehicles
- Landfill – Direct emissions from the Neal Road Recycling and Waste Facility
- Employee commute and travel – Employee commutes and car rentals for business travel
- Government-generated solid waste – Direct emissions from landfilled waste

[4] The LGOP is a collaborative effort between ICLEI – Local Governments for Sustainability, the California Air Resources Board (CARB), the California Climate Action Registry, and The Climate Registry.

[5] Additional sectors were inventoried, but not included in the CAP due to lack of jurisdictional control.

The GHG emissions inventory is based on activity data collected for each sector, such as the kilowatt-hours (kWh) of electricity or therms of natural gas used for the residential, commercial, and industrial energy sectors; VMT for the transportation sector; or million gallons of water used by the community in a single calendar year. These activities are converted to GHG emissions using an emissions factor or coefficient supplied by resource providers or emissions modeling software that indicates the GHGs emitted for every kWh produced, mile traveled, or ton of waste disposed. **Appendix B** identifies emissions factors used within the CAP.

The inventory measures emissions of three primary GHGs—carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). These GHGs are then converted to metric tons of carbon dioxide equivalent emissions ($MTCO_2e$) by comparing the global warming potential (GWP) of each gas to CO_2. For example, CH_4 is 21 times more powerful than CO_2 on a per-weight basis in its capacity to trap heat, while nitrous oxide (N_2O) is 310 times more powerful than CO_2. This conversion enables the County to consider different GHGs in comparable terms.

Community Inventory and Government Operations

The community inventory counts emissions generated by activities occurring in the unincorporated county. County government operations occur in unincorporated areas, but many facilities are also located in incorporated cities (e.g., the County facilities located in Oroville). Emissions generated by County operations are much smaller than those generated by the community at large, and it is not feasible to accurately identify which government operations emissions occur within the unincorporated area. Therefore, the government operations inventory and the community inventory are treated as separate, non-comparable items.

Baseline 2006 Inventories

Community

To support the CAP, the County reviewed and updated a Butte County 2006 baseline community GHG emissions inventory and 2020 and 2030 emissions forecasts originally prepared for *Butte County General Plan 2030*. Additional information concerning the review and updates is provided in **Appendix B**. **Table 1** presents the updated 2006 baseline GHG inventory for unincorporated Butte County. As illustrated in **Figure 4**, agriculture was the largest source of GHGs (390,400 $MTCO_2e$, or 43% of inventoried emissions). Transportation (265,450 $MTCO_2e$, 29%) and residential energy use (150,630 $MTCO_2e$, 17%) are the next two largest sectors, respectively. Nonresidential energy use (61,450 $MTCO_2e$, 7%) and off-road equipment, solid waste, wastewater, and water cumulatively accounted for the remaining emissions (43,700 $MTCO_2e$, 5%). It is important to note that some sectors, such as forestry, were inventoried, but excluded from baseline emissions because the County lacks jurisdictional control over them. Although excluded from the emissions totals in this CAP **(Table 1** and **Figure 4)**, forestry was analyzed for informational purposes only.

Table 1: 2006 Community Inventory

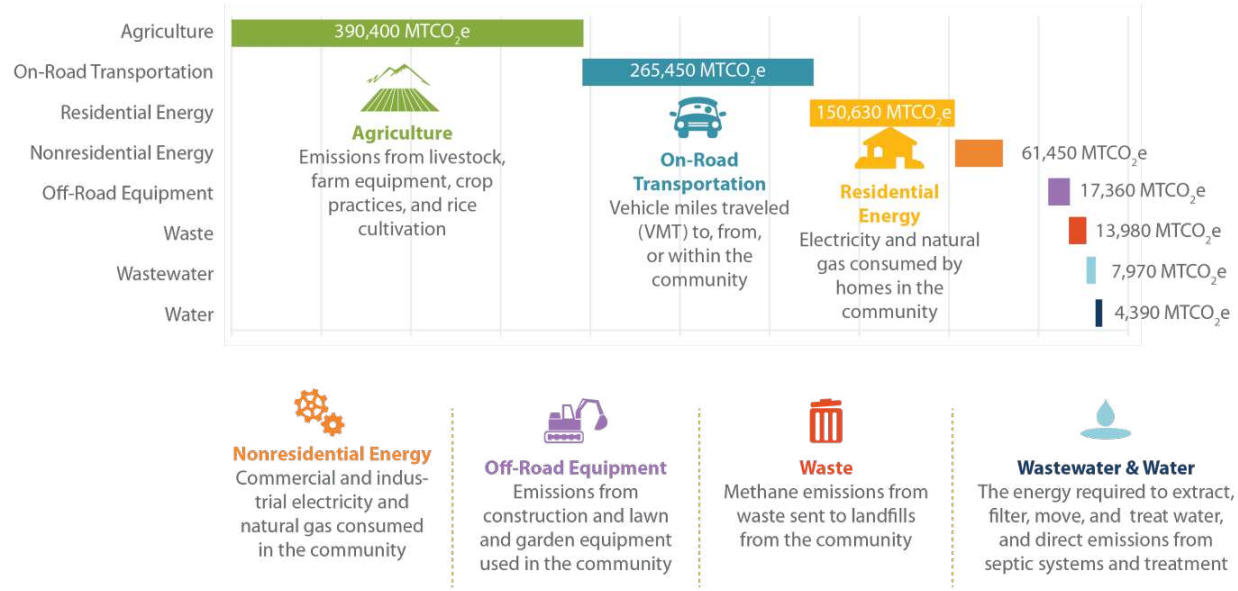
Sector*	2006 GHG Emissions	
	$MTCO_2e$	Percent of Total**
Agriculture	390,400	43%
Transportation	265,450	29%
Residential energy	150,630	17%
Nonresidential energy	61,450	7%
Off-road equipment and vehicles	17,360	2%
Solid waste	13,980	2%
Wastewater	7,970	1%
Water	4,390	<1%
Total	**911,630**	**100%**

Notes:

**Additional sectors (e.g., forestry) were inventoried, but not included due to lack of jurisdictional control.*

***Due to rounding, percent of total column may not equal 100%.*

Figure 4: 2006 Community Emissions by Sector


Agriculture
On-Road Transportation
Residential Energy
Nonresidential Energy
Off-Road Equipment
Waste
Wastewater
Water
390,400 MTCO2e
265,450 MTCO2e
150,630 MTCO2e
61,450 MTCO2e
17,360 MTCO2e
13,980 MTCO2e
7,970 MTCO2e
4,390 MTCO2e
Agriculture
Emissions from livestock, farm equipment, crop practices, and rice cultivation
On-Road Transportation
Vehicle miles traveled (VMT) to, from, or within the community
Residential Energy
Electricity and natural gas consumed by homes in the community
Nonresidential Energy
Commercial and industrial electricity and natural gas consumed in the community
Off-Road Equipment
Emissions from construction and lawn and garden equipment used in the community
Waste
Methane emissions from waste sent to landfills from the community
Wastewater & Water
The energy required to extract, filter, move, and treat water, and direct emissions from septic systems and treatment

Government Operations

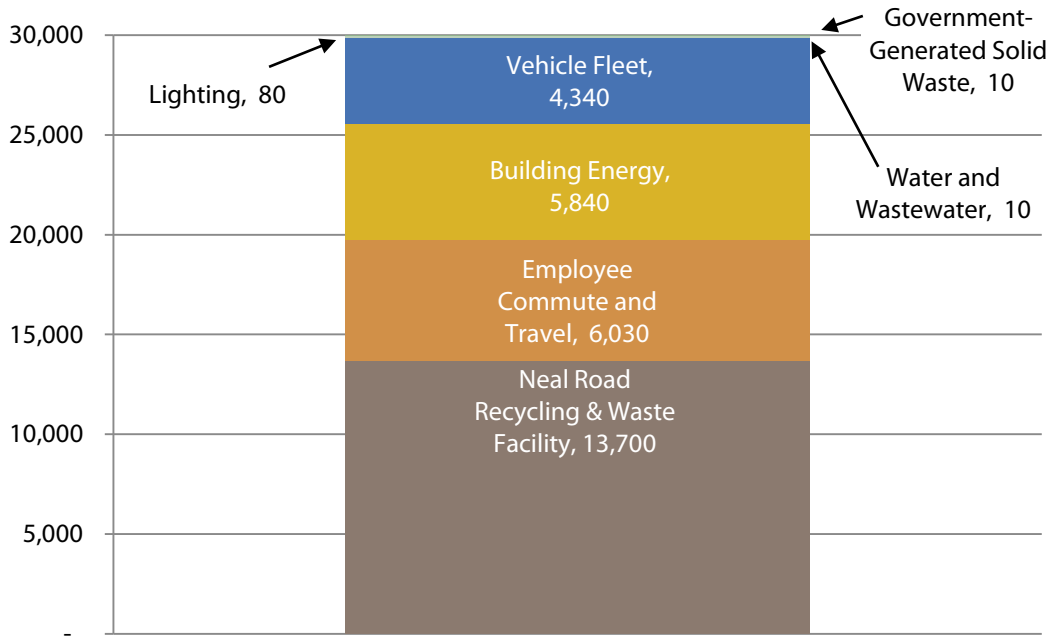
Baseline (2006) government operations emissions for Butte County were calculated using data collected by the County in a manner consistent with best practices and methods recommended by the LGOP. As illustrated in **Figure 5** and **Table 2**, inventoried emissions in 2006 totaled 30,010 $MTCO_2e$. The Neal Road Recycling and Waste Facility was the largest source of emissions in 2006, resulting in 13,700 $MTCO_2e$ (46% of total emissions). Employee commute and travel was the second-largest sector, resulting in 6,030 $MTCO_2e$ (20% of total

government operations emissions). Building energy emissions (5,840 $MTCO_2e$, 19%) and vehicle fleet emissions (4,340 $MTCO_2e$, 14%) were the third- and fourth-largest emissions sources. Lighting, water and wastewater, and government-generated solid waste together resulted in 100 $MTCO_2e$ (less than 1%).

Table 2: 2006 Government Operations Inventory

Sector	2006 GHG Emissions	
	$MTCO_2e$	**Percent**
Neal Road Recycling and Waste Facility	13,700	46%
Employee commute and travel	6,030	20%
Building energy	5,840	19%
Vehicle fleet	4,340	14%
Lighting	80	<1%
Water and wastewater	10	<1%
Government-generated solid waste	10	<1%
Total	**30,010**	**100%**

Figure 5: 2006 Government Operations Emissions by Sector ($MTCO_2e$)



Emissions Forecasts

A business-as-usual emissions forecast estimates how emissions would grow over time if no action is taken at the federal, state, or local level to reduce them. An emissions forecast was prepared for Butte County, assuming 2006 activity data rates (e.g., energy consumption per household, waste disposed per person) remain constant. The forecast addresses 2020 and 2030. The 2020 target year corresponds to AB 32, while the 2030 target year corresponds to the General Plan.

A set of indicators determines the extent of growth that could occur and how resulting emissions may change. **Appendix B** identifies growth indicators, sectors, and sources used to forecast community and government operations emissions in Butte County.

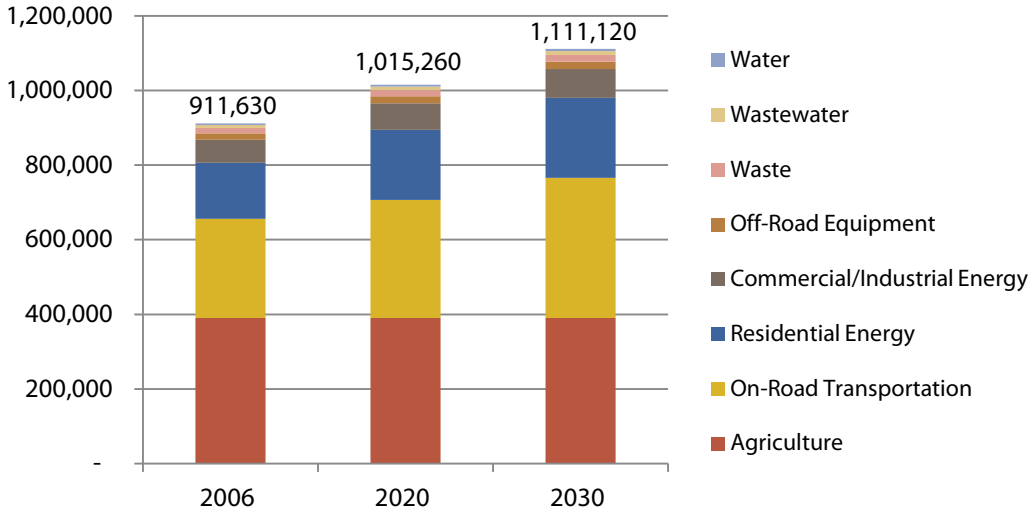
Community Forecast

Under the anticipated growth scenario, community emissions would increase to 1,015,260 $MTCO_2e$ by 2020, or 11% above 2006 emissions. By 2030, emissions would grow to approximately 1,111,120 $MTCO_2e$, or 22% above 2006 emissions **(Table 3** and **Figure 6)**.

Table 3: Community Business-as-Usual Emissions Forecasts

Sector	$MTCO_2e$		
	2006	**2020**	**2030**
Agriculture	390,400	390,400	390,400
Transportation	265,450	316,280	375,390
Residential energy	150,630	187,600	214,010
Nonresidential energy	61,450	71,130	78,030
Off-road equipment and vehicles	17,360	19,180	19,520
Waste	13,980	16,280	17,920
Wastewater	7,970	9,280	10,220
Water	4,390	5,110	5,630
Total	**911,630**	**1,015,260**	**1,111,120**
Percent change from 2006	-	+11%	+22%

Figure 6: Community Business-as-Usual Emissions Forecasts by Sector ($MTCO_2e$)



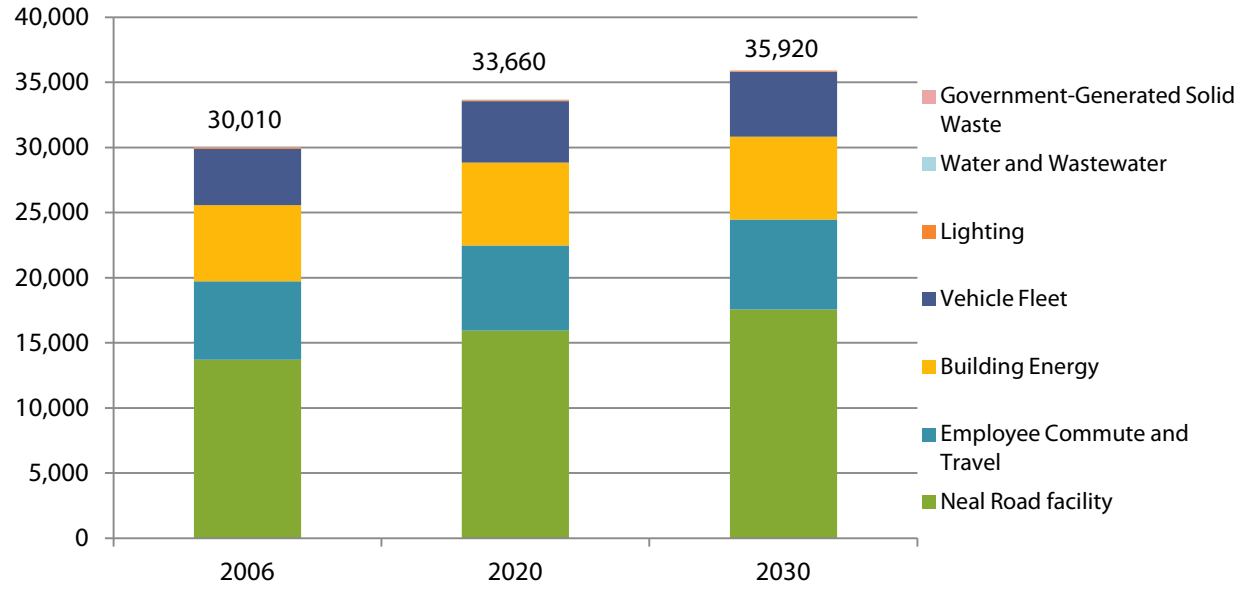
Government Operations Forecast

As illustrated in **Table 4** and **Figure 7**, government operations emissions would grow by 12% (3,650 $MTCO_2e$) from 2006 to 2020, and by 20% (5,910 $MTCO_2e$) from 2006 to 2030 under a business-as-usual scenario. Most of this increase is related to anticipated growth in service population within the unincorporated county under the General Plan, which would directly increase emissions in the Neal Road Recycling and Waste Facility and lighting sectors, and would indirectly increase emissions in remaining government operations sectors by increasing need for County staff, buildings, and services.

Table 4: Government Operations Business-as-Usual Emissions Forecasts

	$MTCO_2e$		
Sector	**2006**	**2020**	**2030**
Neal Road Recycling and Waste Facility	13,700	15,950	17,560
Employee commute and travel	6,030	6,530	6,910
Building energy	5,840	6,370	6,370
Vehicle fleet	4,340	4,700	4,970
Lighting	80	90	90
Water and wastewater	10	10	10
Government-generated solid waste	10	10	10
Total	**30,010**	**33,660**	**35,920**
Percent change from 2006	--	+12%	+20%

Figure 7: Government Operations Business-as-Usual Emissions Forecasts by Sector ($MTCO_2e$)



Reduction Targets

CHAPTER 3

This chapter identifies Butte County's greenhouse gas (GHG) reduction goals and demonstrates early progress toward these goals. The reduction goal represents the overall objective of the Climate Action Plan (CAP) and provides a quantitative benchmark to assess progress. Accounting for early accomplishments enables the CAP to appropriately focus on future steps needed to reduce GHGs.

Reduction Goals

State Guidance

The California Environmental Quality Act (CEQA) Guidelines recommend that a CAP contain an emissions reduction goal. Lead agencies are responsible for setting goals for future years. Several air quality management districts have provided further guidance to assist agencies with GHG reduction goals. At the time of CAP preparation, the Butte County Air Quality Management District (BCAQMD) has not adopted plan-level GHG reduction guidance for jurisdictions within Butte County. BCAQMD's 2008 *CEQA Air Quality Handbook* (the currently effective version) does not establish thresholds of significance for GHG emissions, but does identify that larger projects should consider preparing an analysis of GHG emissions impacts as part of

CEQA review, and makes numerous references to methods identified in the California Air Pollution Control Officers Association (CAPCOA) white paper *CEQA and Climate Change*. The March 2012 draft handbook acknowledges the ability for future projects consistent with a CAP to streamline analysis of GHG emissions pursuant to CEQA, as described in **Chapter 1**.

Following adoption of Assembly Bill (AB) 32, the California Air Resources Board (CARB) adopted the AB 32 Climate Change Scoping Plan (Scoping Plan), identifying a state-recommended reduction goal for local governments to achieve 1990 emissions levels by 2020, which the Scoping Plan equates to a 15% reduction below existing emissions. Based on this guidance, air districts and local jurisdictions throughout California have interpreted "existing emissions" as baseline emissions occurring between 2005 and 2008. Therefore, **the reduction target for this CAP is to reduce 2020 GHG emissions to 15% below baseline 2006 levels.**

Executive Order (EO) S-3-05 identifies non-binding GHG emissions reduction goals beyond 2020. Issued in 2005, EO S-3-05 presents progressive GHG emissions reduction goals for the state, including (1) a 1990 emissions level goal by 2020, and (2) an 80% reduction below 1990 levels by 2050. Interpolating the 2050 goal for interim years would result in a 42% reduction below baseline emissions levels by 2030.

General Plan 2030 Emissions Reduction Goals

In addition to state guidance, the County's General Plan also identifies a GHG emissions reduction target. Conservation and Open Space Element Goal COS-1 identifies the following GHG reduction goal for 2020: "Reduce greenhouse gas emissions to 1990 levels by 2020." General Plan actions to achieve this goal commit the County to prepare a CAP, and as part of the CAP, to "identify methods to reduce GHG emissions to a level that would achieve reduction consistent with State guidelines at the time of quantification" (COS-A1.1, Action c). Therefore, the General Plan defers to state guidance for methods to identify 1990 levels. Goal COS-1 applies to 2020 emissions. The General Plan does not establish a similar reduction goal for 2030. However, the General Plan does commit the County to identifying a 2030 reduction goal by 2020 (refer to COS-A1.1, Actions h, i).

Achieving Emissions Reduction Goals

As shown in **Table 5**, the County needs to reduce community emissions by 24% (240,370 $MTCO_2e$) below forecast levels to achieve a 15% reduction below baseline 2006 levels in 2020. Similarly, to be on a trajectory toward the EO S-3-05 goal for 2050, the County would need to reduce community emissions by 52%, to achieve a 42% reduction below baseline 2006 levels in 2030. Consistent with the General Plan, the primary focus of this CAP is to achieve a 2020 reduction goal. However, to demonstrate long-term progress toward 2030 reductions, a 2030 goal is provided for context. Consistent with the General Plan, the County will continue to evaluate progress achieving 2020 goals and current state guidance to identify an appropriate 2030 reduction target by 2020.

Table 5: Community Emissions Reduction Goals

	2020	**2030**
Reduction goals (percent below baseline)	**-15%**	-42%
Community emissions goals ($MTCO_2e$)	774,890	531,780
GHG forecasts ($MTCO_2e$)	1,015,260	1,111,120
Reductions needed ($MTCO_2e$)	**-240,370**	-579,340
Percent reduction needed to achieve goals	-24%	-52%

Reduction goals for community GHG emissions can also be applied to government operations. **Table 6** outlines recommended government operations emissions reduction goals and necessary reductions. Without County action, government emissions would exceed state-recommended reduction goals by over 5,000 $MTCO_2e$ by 2020. The County needs to reduce government operations emissions by approximately 24% below forecast levels (8,150 $MTCO_2e$) to achieve a 15% reduction below baseline 2006 levels in 2020. Similarly, the County would need to reduce government operations emissions by approximately 51% from forecast levels (18,510 $MTCO_2e$) to achieve a 42% reduction below baseline 2006 levels.

Table 6: Government Operations Emissions Reduction Goals

	2020	2030
Reduction goals (percent below baseline)	**-15%**	-42%
Government operations emissions goals ($MTCO_2e$)	25,510	17,410
GHG forecasts ($MTCO_2e$)	33,660	35,920
Reductions needed ($MTCO_2e$)	**-8,150**	-18,510
Percent reduction needed to achieve goals	-24%	-51%

Current Progress to Goals

The County has a successful track record of supporting programs and initiatives that promote environmental sustainability at the local level. The state has also taken action by passing a full range of environmental laws that are actively reducing emissions throughout California. This section identifies activities and requirements implemented at the state and local levels since 2006 and their benefits to reducing local emissions. These activities and requirements have already set the County on a path to achieve its reduction goals.

State Actions

Since passing AB 32, the state has enacted numerous regulations and programs to reduce GHG emissions. Although statewide in scope, these actions affect vehicle emissions, the renewable energy content of electricity, energy efficiency in new buildings, and renewable energy systems at the local level, thereby reducing local GHG emissions.

Quantified Accomplishments

Key state programs and requirements that affect local emissions in Butte County are described below and credited toward the 2020 emissions reduction target.

Pavley Vehicle Standards and Low Carbon Fuel Standard

AB 1493 (2002) regulations require manufacturers of new passenger vehicles to reduce tailpipe GHG emissions from 2009 to 2020. The emissions benefits from implementation of the Pavley standards are quantified using the CARB EMFAC emissions model. The Low Carbon Fuel Standard (LCFS) calls for a reduction of at least 10% in the carbon intensity of California's transportation fuels by 2020. Although the LCFS is currently being challenged in the courts, CARB is actively implementing the LCFS; therefore, it is included in this analysis. In 2020, these standards for more efficient vehicles would reduce emissions in Butte County by 79,730 $MTCO_2e$.

California Renewables Portfolio Standard

One of the most ambitious renewable energy standards in the country, the Renewables Portfolio Standard (RPS) mandates that 33% of electricity delivered by investor-owned utilities in California, including PG&E, be generated by renewable sources like solar, wind, and geothermal by 2020. Senate Bill (SB) 1078 first codified the California RPS in 2002, requiring a 20% renewable electricity mix by 2010. SB X 1-2 further strengthened the RPS in April 2011, requiring a 33% renewable electricity mix by 2020. As of 2012, PG&E's renewable energy generation made up 19% of the electricity portfolio. In 2020, cleaner energy from RPS would reduce emissions in Butte County by 16,860 $MTCO_2e$.

Title 24, Energy Efficiency Standards

Title 24 of the California Code of Regulations is a statewide standard applied by local agencies through building permits. It includes requirements for the structural, plumbing, electrical, and mechanical systems of buildings and for fire and life safety, energy conservation, green design, and accessibility in and around buildings. Part 6 (the California Energy Code) and Part 11 (the California Green Building Standards Code) include prescriptive and performance-based standards to reduce electricity and natural gas use in every new building constructed in California. The GHG reduction benefits of these standards to Butte County include the net energy benefit of new Title 24 requirements that did not exist in the 2006 baseline year. As Title 24 standards are regularly updated, anticipated advances in energy efficiency requirements are included in GHG emissions reductions. In 2020, energy saved in new buildings resulting from Title 24 would reduce emissions in Butte County by 5,350 $MTCO_2e$.

Community

As shown in **Table 7**, state programs and requirements would reduce emissions by approximately 101,940 $MTCO_2e$ per year in 2020. The majority of these reductions are due to the Pavley standards and the RPS. Considering the 2020 emissions forecast of 11% above 2006 baseline emissions levels identified in **Chapter 2**, the local benefit of these state reductions would reduce 2020 emissions in Butte County to just under 1% above 2006 levels.

Table 7: Local Reduction Benefits of State Programs and Requirements on Community Emissions

	$MTCO_2e$		
	2006	**2020**	**2030**
Emissions	**911,630**	**1,015,260**	**1,111,120**
Pavley standards and LCFS	–	-79,730	-115,610
Renewables Portfolio Standard	–	-16,860	-26,420
Title 24, Energy Efficiency Standards	–	-5,350	-18,050
Total state reductions	**–**	**-101,940**	**-160,080**
Emissions with state reductions	911,630	913,320	951,040
Percentage change from 2006	**–**	**+<1%**	**+4%**

Government Operations

State programs and requirements also affect government operations emissions, as shown in **Table 8**. Considering the 2020 emissions forecast of 12% above 2006 baseline emissions levels identified in **Chapter 2**, the local benefit of these state reduction measures would reduce 2020 government operations emissions in Butte County to about 1% above 2006 levels. The majority of reductions come from the Pavley and LCFS standards, which reduce emissions from employee commutes and the County's fleet, as newer, more fuel-efficient vehicles are purchased by the County and by staff.

Table 8: Local Reduction Benefits of State Programs and Requirements on Government Operations Emissions

	$MTCO_2e$		
	2006	**2020**	**2030**
Emissions	**30,010**	**33,660**	**35,920**
Pavley and LCFS standards	–	-2,890	-3,750
Renewables Portfolio Standard	–	-330	-540
Title 24, Energy Efficiency Standards	–	-30	-30
Total state reductions	**–**	**-3,250**	**-4,320**
Emissions with state reductions	–	30,410	31,600
Percentage change from 2006	**–**	**+1%**	+5%

Butte County Local Accomplishments

Butte County is also doing its part to implement policies and programs that conserve resources and reduce emissions. This section highlights specific actions taken by the County since 2006 to reduce emissions through 2012 and quantifies additional reductions that will result from continued implementation of those actions through 2020.

Quantified Accomplishments

Local accomplishments initiated or completed since 2006 are identified below. Although Butte County has reduced emissions through numerous local accomplishments since 2005, this section describes local accomplishments throughout Butte County that can be quantified using existing, generally accepted methods. Accomplishments include:

- **Solar photovoltaic arrays (California Solar Initiative (CSI) and Butte College).** This accomplishment quantifies GHG reductions that occur from solar photovoltaic (PV) installations. Quantified reductions account for solar arrays installed via the CSI, which provided rebates for solar installations, and panels installed at Butte College.

- **Reductions in crop residue burning.** Residue burning refers to the burning of crop lands after they are harvested to clear the land of residual vegetation. Since 2006, farmers have decreased the amount of residue crops that are burned. Instead, farmers have expanded chipping of agricultural residue. Chipped residue from orchards can be composted or used as organic materials. By reducing crop burns, farmers have been improving air quality and reducing GHG emissions.
- **Reductions in fertilizer and pesticide use, and conversion to less GHG-intensive crops.** In response to changing regulations and the costs of fertilizer, farmers have optimized the use of fertilizer and pesticides. Both fertilizers and pesticides emit direct and indirect GHG emissions that are captured in the community inventory. Farmers have reduced fertilizer and pesticides while maintaining high crop yields. Additionally, farmers have been converting to less GHG-intensive crops. For instance, many row crops have been converted to orchards. Orchards generally require less fertilizer and pesticides than row crops.
- **Increased solid waste diversion rate (2006–2012).** Between 2006 and 2012, the solid waste diversion rate for the unincorporated county increased from 56% to 59%. The County receives credit for the decrease in methane that will be emitted over time as a result of less landfilled waste.
- **Landfill gas power plant**. Captured methane from the Neal Road Recycling and Waste Facility is used to generate over 15,000,000 kWh per year. This accomplishment accounts for the energy saved as a result of this renewable energy resource.
- **Annexations of land with residential and nonresidential energy use into incorporated areas**. The General Plan identifies priority areas for annexation into incorporated cities. This accomplishment quantifies the reduction in County GHGs that will be assumed by cities.
- **Increased proportion of multi-family units.** The 2020 and 2030 GHG forecasts assume each household will consume the same average energy level as it did in 2006. The General Plan Land Use Element identifies an increased proportion of multi-family units in 2020 and 2030 relative to 2006. Multi-family units are generally less energy intensive than single-family units. The average energy intensity per household has been adjusted to reflect the expected mix of housing types. The resulting GHG reductions are credited against the 2020 and 2030 forecasts.
- **Complete streets ordinance.** The County has adopted complete streets and land use policies that encourage alternative transportation and efficiently provide access for pedestrians, bicyclists, buses, and motor vehicles. The VMT reduction and associated GHG reduction benefits of the ordinance are quantified.

Butte County Solar Plant

In 2004, Butte County installed a 1-megawatt solar energy system at the Butte County Government Center in Oroville, providing electricity for three County buildings. In 2013 the County initiated improvements to the system to maximize electricity generation and benefit additional County buildings. The credit for this solar system is already accounted for in the County Government Operations 2006 inventory. However, additional planned improvements for the system will further support the County's progress toward 2020 reduction goals.

Benefit of Local Accomplishments on Community Emissions

Together, state and local accomplishments are expected to reduce 2020 community emissions to 3% below baseline levels. **Table 9** summarizes emissions reductions from local accomplishments for 2020.

Table 9: Accomplishments and Progress to Target

Activities and Accomplishments	$MTCO_2e$		
	2006	**2020**	**2030**
Emissions with state reductions	**911,630**	**913,320**	**951,040**
Solar PV arrays (CSI and Butte College)	–	-1,730	-1,640
Reductions in crop residue burnings	–	-790	-790
Reductions in fertilizer and pesticide use, and conversion to less GHG-intensive crops	–	-15,880	-15,880
Increased solid waste diversion rate (2006–2012)	–	-1,020	-1,020
Landfill gas power plant	–	-2,770	-2,620
Annexations of land with residential and nonresidential energy use into incorporated areas	–	-440	-4,240
Increased proportion of multi-family units	–	-1,320	-2,540
Complete streets ordinance	–	-6,150	-6,750
Total reductions	**–**	**-30,100**	**-35,480**
Emissions with state and local reductions	911,630	883,220	915,560
Percentage change from 2006	**–**	**-3%**	**+<1%**
Emissions reduction goal	–	-15%	-42%
Target emissions level ($MTCO_2e$)	–	774,890	531,780
Remaining reductions needed to achieve goal ($MTCO_2e$)	–	-108,330	-383,780

These reductions provide a community-wide credit for GHG emissions. Additionally, the County has or is currently implementing numerous initiatives that reduce costs and emissions. While each does not yield a direct GHG reduction credit due to early start dates before the 2006 baseline and limited data, nonetheless, these actions demonstrate the benefit of programs to the community and improve County operations.

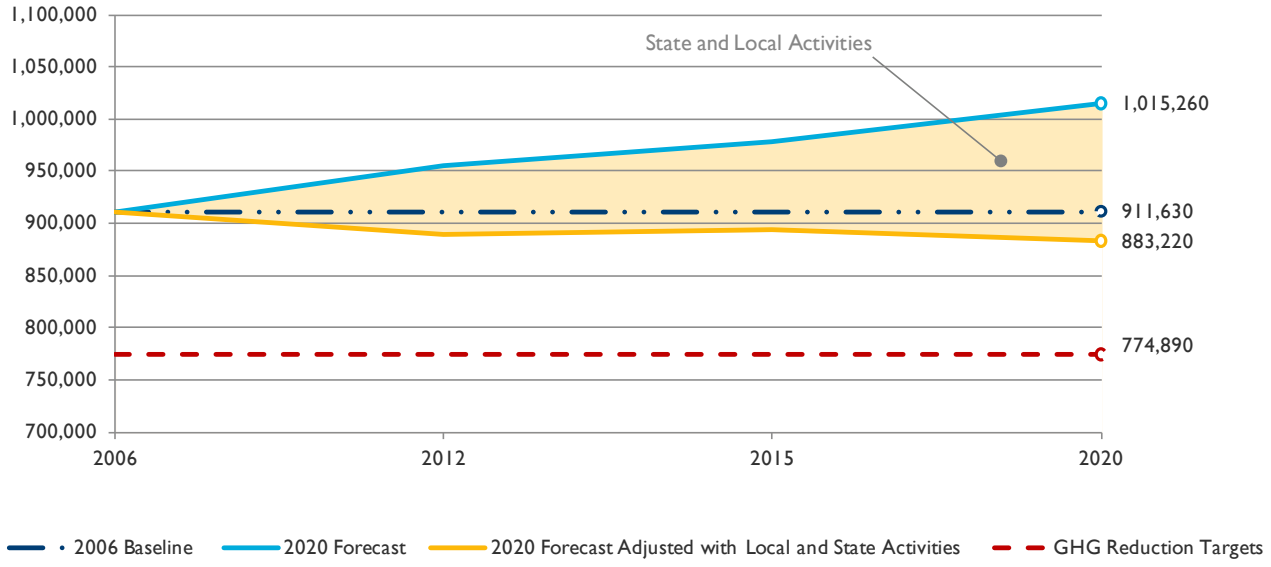
Specifically, several County actions support the CAP, but are not quantified for GHG emissions credit:

- Waste franchise agreements to reduce redundant dump truck trips throughout the County (in process as of fall 2013)
- County policy to encourage purchase of environmentally preferable products
- County policy for all new County facilities to meet LEED Silver standards or its equivalency
- One of the first online permit processes in the state for rooftop solar PV installation

Summary of Progress and Remaining Gap

Assessing the benefits of state and local accomplishments gives the County credit for work done to date and helps the community better understand the anticipated GHG emissions from the activities of residents, employees, businesses, and government. As reported in **Table 9** (above) and **Figure 8** (below), accounting for reductions from both local and state actions, the unincorporated Butte County community needs to reduce emissions by an additional 108,330 $MTCO_2e$ by 2020 to achieve the emissions reduction goal of 774,890 $MTCO_2e$ (15% below 2006 baseline levels). Progress is shown below relative to the 2020 reduction goal. Additional information describing 2030 reductions is provided at the end of **Chapter 4** for context, supporting the County's ability to consider an appropriate 2030 goal in the future.

Figure 8: Butte County Community Emissions Forecast and Target Gap



Strategy to Reduce Emissions

CHAPTER 4

Addressing the Causes of Climate Change

This chapter provides a strategy to achieving community and government operations GHG reduction goals. Emissions reductions result from changes to future activities, including the miles traveled by vehicles, sources of electricity, agricultural practices, and the amount of energy used in homes and businesses. The following sections of this chapter present the County's plan to incentivize additional changes in these activities and, as a result, to reduce GHG emissions.

Anticipated Emissions Reductions

The reduction measures included in this chapter identify actions that can be implemented to reduce emissions and achieve the 15% reduction goal by 2020. Strategies focus on agriculture, renewable energy generation, and voluntary energy efficiency upgrades to achieve most GHG reductions. **Table 10** summarizes anticipated emissions reductions in 2020. **Appendix B** provides similar detail for 2030 reductions.

Implementing the CAP would reduce community emissions 16.2% below 2006 levels by 2020, allowing Butte County to surpass the 15% reduction goal, as shown in **Figure 9**. The largest share of these reductions comes from energy efficiency and renewable energy measures, although reduction measures in all sectors are needed to meet and exceed the 2020 goal.

Table 10: Anticipated 2020 Emissions Reductions from Climate Action Plan Measures

	2020 $MTCO_2e$
2006 baseline emissions	**911,630**
2020 emissions forecast with state and local reductions	**883,220**
Energy efficiency and renewable energy measures	-89,420
Alternative fuel vehicles and equipment measures	-1,730
Transportation measures	-1,840
Agriculture measures	-14,380
Solid waste measures	-12,170
Total reductions from CAP measures	**-119,540**
2020 emissions with CAP	763,680
Percentage reduction below 2006	**-16.2%**

Figure 9: 2020 GHG Emissions Reductions by Focus Area ($MTCO_2e$)

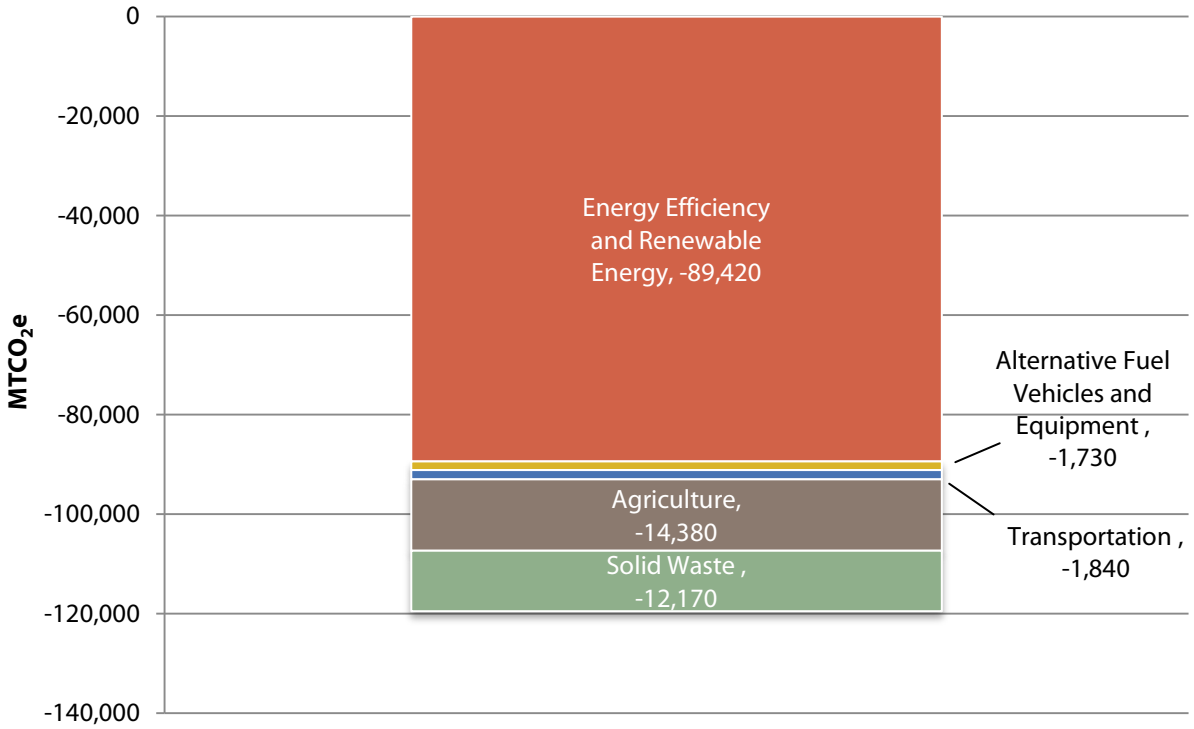
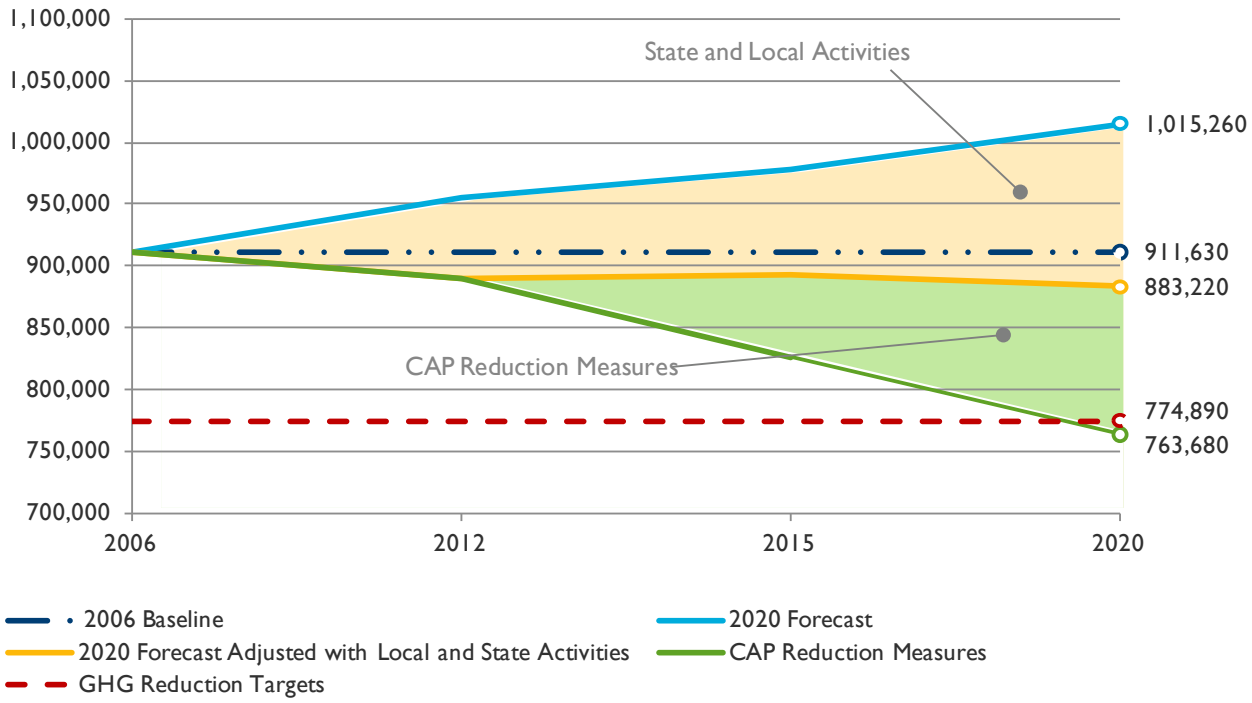


Figure 10 illustrates anticipated progress toward achieving and exceeding the reduction target by 2020. For more reduction measure details, please refer to **Chapter 6** and **Appendix B**.

Figure 10: 2020 Emissions Reductions with Climate Action Plan ($MTCO_2e$)



As noted in **Chapter 2** and **Chapter 3**, government operations emissions and the associated reduction target are distinct from community emissions. Implementation of the government operations measures described below would reduce 2020 emissions by 10,290 $MTCO_2e$, or 33% below baseline levels. The government operations strategy primarily depends on documenting the methane captured at the Neal Road Recycling and Waste Facility, retrofitting government buildings to be more energy efficient, and encouraging employees to reduce miles traveled commuting to work and conducting government business. For more detailed information on the government operations GHG reductions strategy, please refer to **Chapter 6** and **Appendix B**.

Identifying and Quantifying Reduction Measures

The emissions reductions listed above are the outcome of a rigorous process conducted to identify the most appropriate strategies for Butte County and to quantify their effect on GHG emissions. The following sections outline this process and present proposed GHG reduction strategies.

Focus Areas

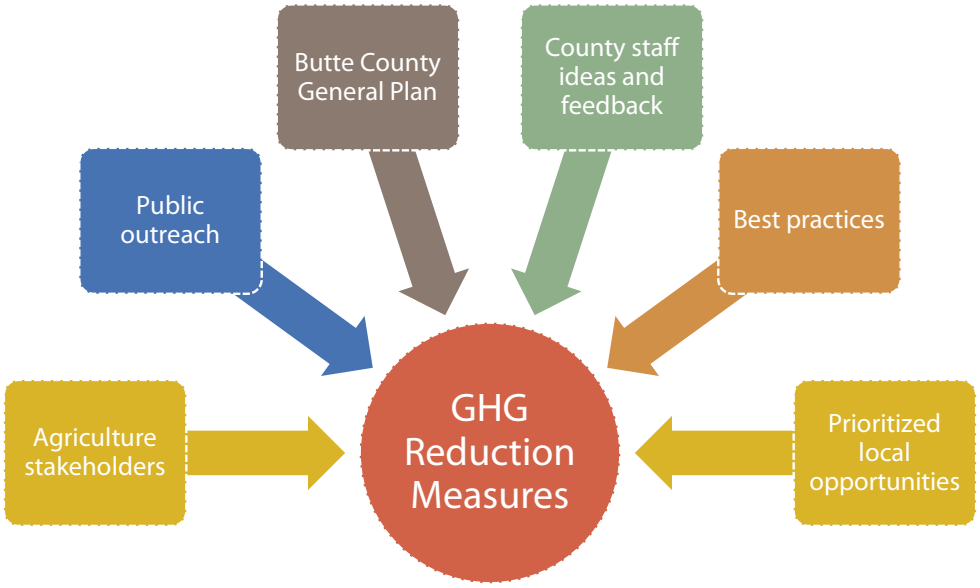
The first step in developing reduction measures is to identify focus areas. Emissions sectors from the Butte County community GHG inventory, stakeholder input, and County staff priority were used to identify the following focus areas. Similar to emissions sectors described in previous chapters, these focus areas group measures and actions into similar categories. The six focus areas are:

- Energy efficiency and renewable energy (EN)
- Alternative fuel vehicles and equipment (F)
- Transportation (T)
- Agriculture (AG)
- Solid waste (W)
- Government operations (GO)

Objectives and Measures

Within each focus area, the CAP identifies an objective and a series of measures and actions. *Objectives* outline the general purpose for each focus area. *Measures* address specific topics within each focus area at a greater level of detail than objectives. *Actions* provide specific detailed steps to implement the measure. Objectives, measures, and actions were developed using an iterative process that considers specific opportunities and constraints in Butte County, stakeholder input, and regional best practices. **Figure 11** identifies some considerations that were incorporated into the reduction measures.

Figure 11: Input for Reduction Measures



Quantification Methods

Emissions reduction estimates have been calculated for each measure for the year 2020. The emissions reduction benefit of each measure is determined by changes in operation, activity, or efficiency. The 2006 baseline inventory and 2020 forecast serve as the foundation for quantifying reduction measures. Activity data from the inventory (e.g., VMT, kWh of electricity) is used with performance metrics to calculate the emissions reduction potential of each measure. *Performance metrics* provide specific participation or efficiency levels for implementation of each measure (e.g., number of participating households, total renewable energy installed). This approach ensures that emissions reductions relate to baseline and future activities in the community. Specific quantification calculation information is available for each quantified measure in **Appendix B**.

Additional Factors

In addition to GHG reductions, a number of other factors were considered when evaluating measures.

- Would this measure benefit the community beyond GHG reductions?
- Does the County have the time and resources to successfully implement this measure?
- Who will be responsible for implementing this measure?

Community acceptance is a critical component of CAP implementation. Looking beyond the numbers and focusing on the practicality and benefits of the new measures lays the groundwork for wider support and can help ensure that the CAP is successful in maintaining Butte County as a great place to live, work, and play. The CAP considers the following criteria for each measure.

Who's Responsible: As outlined below, all County departments would play a role in implementing the CAP. Additional participation by stakeholders, partners, and community members is also required to fully implement the GHG reduction strategy. The action required by County staff and the community to achieve the quantified reduction is described for each reduction measure.

Community Benefits: Looking beyond emissions reductions, many measures also support improving the quality of life for residents and businesses in Butte County. Additional community benefits are identified for each measure as follows.

Supports Agriculture | Expands Alternative Energy | Promotes Business | Reduces Energy Costs | Protects Natural Resources | Improves Public Health | Improves Habitability

Chapter 6 presents additional information to enable County staff to prioritize and implement measures. Specifically, the work plan presented in **Chapter 6** provides greater detail regarding primary responsible agencies, supporting agencies, and an estimate of the likely expense and staff time that may be necessary to implement each measure.

Measures by Topic

Energy Efficiency and Renewable Energy (EN) Measures

Maximize energy performance and reduce utility costs in private buildings.

Electricity, natural gas, and propane are used to heat, cool, and light buildings, as well as to operate appliances and machinery. Consistent with the California Energy Commission (CEC) preferred loading order, the measures and actions identified in this focus area first provide opportunities to conserve energy and maximize energy efficiency, then identify opportunities for residents and businesses to utilize renewable energy sources. The key measure in this focus area (EN6) seeks to help land and building owners capitalize on non-prime farmland and manufacturing facility roof space to generate renewable energy.

EN1. Connect homeowners to financing and resources for retrofits.

Most residential buildings in the county depend on electricity and natural gas for heating and cooling. Older buildings often require more energy to heat and cool houses due to inefficient building materials such as single-pane windows, insufficient insulation, and old heating, ventilation, and air conditioning (HVAC) equipment. Although residential retrofits often pay for themselves with reduced energy bills, few residents have the extra money necessary to pay upfront costs. This measure identifies actions to assist Butte County homeowners to secure financing, rebates, and other resources to retrofit their homes.

Actions:

- Participate in a program to provide additional low-cost financing for energy retrofits in Butte County to supplement available rebates from programs such as Energy Upgrade California and the California Home Energy Retrofit Opportunity (HERO) program administered by the Western Riverside Council of Governments.
- Host booths at home fairs.
- Encourage home remodels or additions to achieve California Green Building Standards Code (CALGreen) compliance by promoting available financing programs such as Energy Upgrade California or other local rebate programs.
- Provide pamphlets on financing programs with permits.
- Partner with local contractors to promote retrofits in the low-income housing stock through weatherization programs.

2020 GHG Reduction: -3,200 $MTCO_2e$

Who's Responsible:

- County: Participates in and promotes program
- Others: 4,920 households participate in a retrofit program (20% of single-family homes built before 2006)

Community Benefits:

Reduces Energy Costs

Protects Natural Resources

Improves Habitability

EN2. Promote residential appliance upgrades.

Many residential buildings in Butte County also depend on electricity and natural gas to operate appliances such as cooking ranges, refrigerators, and televisions. More efficient appliances require less fuel for successful operation, saving residents money and lowering emissions across the county. This measure promotes the purchase of ENERGY STAR and other energy-efficient appliances.

Actions:

- Track the number of energy-efficient or smart-grid-integrated appliances installed in new development and major remodels through the County's permit tracking system.

- Promote ENERGY STAR or energy-efficient appliances with County outreach materials including existing home improvement programs, rebate programs, and program monitoring.

Who's Responsible:

- County: Tracks and promotes appliance upgrades
- Others: 3,940 households participate in appliance upgrades (20% of homes built by 1990)

2020 GHG Reduction: -1,560 $MTCO_2e$

Community Benefits:

Reduces Energy Costs

Protects Natural Resources

Improves Habitability

EN3. Connect low-income homeowners to financing and resources for retrofits.

Low-income households are especially sensitive to energy costs because they generally occupy older, more energy-inefficient housing units and spend a larger proportion of their income on energy. By assisting with low-income household retrofits, the County can simultaneously reduce emissions and increase low-income families' capacity to maintain safe and comfortable households despite volatile energy prices and increasing temperatures.

Actions:

- Work with nonprofits to identify highest opportunities for a successful low-income program.
- Encourage workforce training programs to provide free weatherization services to qualified households.
- Partner with workforce training programs such as Living Elements and Valley Contractors Exchange.
- Leverage federal funding for home improvements, such as Community Development Block Grants (CDBG), to improve the energy efficiency and livability of Butte County's lowest-income households.

Who's Responsible:

- County: Coordinates and promotes program
- Others: 1,310 low-income households undergo weatherization (10% of low-income households)

2020 GHG Reduction: -300 $MTCO_2e$

Community Benefits:

Reduces Energy Costs

Protects Natural Resources

Improves Habitability

EN4. Support retrofits in existing nonresidential uses with an emphasis on manufacturing facilities.

In Butte County, nonresidential buildings use electricity and natural gas for heating, cooling, lighting, and other functions. Lacking extensive business license records, it is critical that the County initiate, maintain, and enhance collaborative partnerships with local businesses to achieve energy efficiency and economic development objectives. This measure seeks to increase long-term profitability and viability of businesses, with an emphasis on the manufacturing sector, by facilitating energy efficiency retrofit financing and rebate opportunities.

Actions:

- Develop a voluntary educational program and business inventory to identify energy- and cost-saving opportunities.
- Promote Property Assessed Clean Energy (PACE) financing in partnership with the local chambers of commerce, utilities, and local businesses.
- Partner with utilities and local business leaders to connect local businesses with advanced rebates and assistance for energy retrofits. For example, the County may collaborate with PG&E to map local high energy users and guide County outreach in collaboration with PG&E.
- Conduct an annual awards event to highlight local businesses completing retrofits and saving energy.

Who's Responsible:

- County: Operates educational program and promotes collaboration
- Others: 80 businesses participate in retrofits and/or retrocomissioning (42% of businesses in nonagricultural or food processing sectors)

2020 GHG Reduction: -2,130 $MTCO_2e$

Community Benefits:

Promotes Business

Reduces Energy Costs

Protects Natural Resources

EN5. Work with utility providers to encourage nonresidential appliance upgrades.

Businesses use electricity and natural gas to power appliances ranging from chillers and ovens in restaurants and computers in offices to machinery in factories. Efficient appliances require less fuel for successful operation, saving businesses money and lowering emissions across the county. Measure EN5 promotes the purchase of ENERGY STAR and other energy-efficient appliances.

Actions:

- Track the number of energy-efficient or smart-grid-integrated appliances installed in new development and major nonresidential remodels through the County's permit tracking system.

- Work with third-party providers and utility companies to provide low- to no-cost rebates and incentives for nonresidential appliances and equipment.

Who's Responsible:

- County: Tracks and promotes appliance upgrades
- Others: 30 businesses upgrade appliances (20% of businesses built by 2012)

2020 GHG Reduction: -620 $MTCO_2e$

Community Benefits:

Promotes Business

Reduces Energy Costs

Protects Natural Resources

EN6. Promote energy-efficiency programs and streamline on-site solar PV installations for agricultural and food processing facilities to improve operations and profitability.

Activities related to the agricultural sector such as rice drying and agricultural processing are among the highest energy consumers in the county. PG&E reports estimate that in 2006, agriculture and food processing facilities accounted for approximately 48% of nonresidential kWh and 78% of nonresidential therms in Butte County. High energy use can be one of the top line items in a company's operating expenses. Since agriculture and related sectors are critical components of the local economy, this measure directs the County to work with businesses to understand their energy needs and potential for savings, and then to collaboratively identify strategies to maximize efficiency. This measure also provides the opportunity for businesses and County staff to work with PG&E to develop locally tailored, cost-effective energy reduction actions that meet the needs of Butte County industries, including rice dryers and businesses with other energy-intense agricultural processing facilities.

Additionally, the county includes large areas of non-prime land and facilities with large roof surfaces ideally suited for siting of solar PV panels. As part of this measure, the County will simplify the process for agricultural operations to provide their own electricity using solar PV by streamlining projects limited to 5 acres of PV per parcel or equivalent roof space. Measure EN11 further outlines the County's efforts to streamline renewable energy through development of a solar PV overlay, based on future technical studies to identify appropriate renewable energy sites.

Actions:

- Partner with PG&E to develop a localized, energy-efficiency outreach effort for agricultural processing industries reflecting characteristics of local operations and available financing.
- Provide resources on rebates and financing for appliances and equipment upgrades through stakeholder outreach, including collaboration with utility companies such as PG&E.
- Connect third-party energy-efficiency providers to provide free to low-cost equipment to eligible businesses and large energy users.

- Adopt a solar energy overlay zone to simplify the installation of solar PV in non-prime farmland that would serve on-site agricultural and manufacturing uses. The overlay will expedite the development of solar PV in high opportunity areas while protecting prime farmland and other environmental resources. Solar PV would be limited to 5 acres or less per parcel, consistent with the Butte County Zoning Code.

Who's Responsible:

- County: Provides education and expedites solar installations
- Others: 34 food processing operations implement energy efficiency measures, and up to 600 acres of rooftops and non-prime agricultural land install solar PV (0.20% of agricultural land or rooftops used for solar panels)

2020 GHG Reduction: -70,770 $MTCO_2e$

Community Benefits:

Supports Agriculture

Expands Alternative Energy

Reduces Energy Costs

EN7. Encourage new nonresidential buildings to meet and exceed CALGreen standards for energy efficiency, water conservation, and passive design.

Although there is an upfront cost to design and build more energy- and water-efficient buildings, such efforts result in lower operating costs for the life of the structure. This measure encourages efficient new buildings through outreach and opportunities to mitigate environmental impacts.

Actions:

- Update development checklists and provide guidelines to support optimal energy efficiency.
- Educate builders through working group meetings and CALGreen workshops.
- Partner with local building supply stores to promote cost-effective materials that would help achieve CALGreen Tier 1.
- Seek grants or external funding to reduce building permit costs for buildings that meet CALGreen Tier 1.
- Identify CALGreen Tier 1 or 2 standards as preferred mitigations for the environmental impacts of new nonresidential projects.
- Maintain voluntary CALGreen Tier 1 standards as an option for new buildings.

Who's Responsible:

- County: Promotes energy-efficient building program
- Others: 127,710 new nonresidential square feet built to CALGreen Tier 1 (12% of new nonresidential square footage)

2020 GHG Reduction: -20 $MTCO_2e$

Community Benefits:

Promotes Business

Reduces Energy Costs

Protects Natural Resources

EN8. Expand distributed generation, renewable energy systems for new residential development.

This measure is a blend of regulatory streamlining efforts intended to increase renewable energy generation in new residential development sites. The measure focuses on the renewable energy siting potential of large, master-planned communities. County staff works with developers as master-planned communities proceed through plan review, providing excellent opportunities to discuss appropriate renewable energy siting. This measure also provides actions to expand the County's efforts to encourage renewable energy system installations within single-family and multi-family development projects.

Actions:

- Encourage all new discretionary development projects consisting of more than 500 residential units to achieve zero net energy using solar PV and high-efficiency construction.
- Offer expedited processing for developers providing on-site solar, such as participants in the state's Homebuyer Solar Program.
- Encourage all new discretionary multi-family developments to offer solar options or provide off-site power purchase agreements, following the Homebuyer Solar Program.
- Encourage all new discretionary projects to include solar prewiring for PV.

Who's Responsible:

- County: Expedites processing and promotes program
- Others: 900 new households constructed to net-zero energy standards (13% of all new households constructed by 2020)

2020 GHG Reduction: -1,640 $MTCO_2e$

Community Benefits:

Expands Alternative Energy

Reduces Energy Costs

Protects Natural Resources

EN9. Support distributed generation in new nonresidential development to reduce on-site energy use.

This measure provides actions to incentivize renewable energy installations on new nonresidential projects as they progress through the permitting process. Incentives, streamlined review, expedited processing, and pre-wiring could increase the amount of renewable energy sited in new nonresidential buildings in the county.

New nonresidential developments are also encouraged to maximize roof space in anticipation of future solar PV. These actions will remove barriers to installing solar PV on nonresidential buildings that are most likely to realize benefits from on-site energy. Financing for solar PV can be accomplished through initial construction financing, and could reduce utility bills for energy-intense industries.

Actions:

- Adopt incentives to encourage distributed generation systems, targeting large projects most likely to benefit from on-site energy, including large nonresidential development greater than 10,000 square feet.
- Streamline administrative review process to determine exemptions.
- Offer expedited processing for developers providing on-site solar.
- Encourage new nonresidential development, subject to discretionary review, to prewire for solar PV systems and to maximize roof space to accommodate future rooftop solar installations.

Who's Responsible:

- County: Encourages solar PV and expedites processing
- Others: 440 kW of new nonresidential solar PV potential

2020 GHG Reduction: -110 $MTCO_2e$

Community Benefits:

Expands Alternative Energy

Promotes Business

Reduces Energy Costs

EN10. Encourage the voluntary installation of distributed generation, renewable energy systems throughout the county.

Whereas measures EN8 and EN9 focus on solar PV in new development, this measure supports solar PV in existing development through additional actions to help residents and businesses install renewable energy installations on existing buildings. The County will achieve this by streamlining the permit review process and tying permit costs to the size of the proposed installation.

Actions:

- Revise the permit fee to reflect size of PV installation.
- Streamline the review and approval of solar PV panels through online permitting and easily accessible educational materials.

Who's Responsible:

- County: Facilitates program
- Others: 1,400 pre-2006 homes with solar PV arrays (4% of homes built before 2006), and 27,000 kW of solar PV on pre-2006 nonresidential buildings or sites

2020 GHG Reduction: -9,070 $MTCO_2e$

Community Benefits:

Expands Alternative Energy

Promotes Business

Reduces Energy Costs

EN11. Adopt a solar PV energy overlay zone.

This measure directs the County to conduct a study and consider amendments to the General Plan and Zoning Ordinance to facilitate the GHG reduction benefits from solar PV installation identified in measure EN6. These actions build on Butte County's proactive efforts to promote solar PV. Butte County was an early advocate of solar PV locally and throughout the state. The County was an early adopter of online and streamlined permit processes for solar, and County staff also served on the California Solar Permitting advisory committee, assisting OPR in the development of the *California Solar Permitting Guidebook*. Through this measure, County staff will take a further step to expand solar PV projects through a solar energy overlay zone. Upon completion of technical studies, the County will prioritize areas suitable for solar projects and complete environmental analysis necessary to adopt an overlay allowing for simplified permit procedures. The overlay would facilitate development of solar PV on rooftops, non-prime agricultural lands, and other areas with minimal impacts on agricultural and natural resources. This measure will support energy users in the manufacturing and agricultural processing sectors most likely to benefit from on-site solar. The measure also supports General Plan Policy COS A3.1, which directs the County to prepare a study identifying possible sites for the production of energy using local renewable resources.

County staff will initiate development of an overlay zone, as directed by this measure. Actions below are supportive of the emissions reductions captured in Measure EN6, which account for solar installations on non-prime farmland designed to serve on-site agricultural and processing uses. Following creation of the overlay zone through the steps outlined below, County staff will implement the overlay pursuant to the actions identified in Measure EN6.

Actions:

- Amend the General Plan and Zoning Ordinance with a solar PV energy overlay zone to designate and protect areas for the prioritization of solar energy resources.
- Adopt standards to encourage the development of solar PV energy while protecting environmental resources, streamlining the review of solar energy projects, and expediting the development of solar energy in close proximity to transmission facilities.
- Complete the technical and environmental studies necessary to support preparation of the solar PV energy overlay zone, consistent with General Plan Action Item COS-A3.1.
- During development of technical and environmental studies, evaluate the feasibility of a Community Choice Aggregation program as directed by General Plan Action Item COS-A3.1.

Who's Responsible:

- County: Adopts amendments to planning documents, and prepares supporting studies

2020 GHG Reduction: Supportive

Community Benefits:

Expands Alternative Energy

Reduces Energy Costs

Protects Natural Resources

Alternative Fuel Vehicles and Equipment (F) Measures

Consolidate trips and transition to clean fuels.

On-road vehicles and off-road equipment consume fossil fuels. Fuel used by on-road vehicles can be reduced with a more efficient fleet including electric vehicles and partially electric hybrid vehicles. Fuel used in off-road equipment for construction and lawn or garden equipment can be reduced through operations that are more efficient and by transitioning to alternative fuel sources to power equipment. This focus area identifies best practices and opportunities to increase use of alternative fuels and fuel-efficient vehicles and equipment.

F1. Expand the use of alternative and clean-fuel vehicles.

Transportation accounted for almost 30% of 2006 community baseline emissions. Alternative fueled vehicles produce fewer GHG emissions, but tend to have substantial barriers to entry for most households. This measure provides actions to lower those barriers to entry by facilitating and expanding the use of alternative and clean-fuel vehicles.

Actions:

- Support use of neighborhood electric vehicles, such as low-speed golf courts or other personal neighborhood electrical vehicles.
- Encourage new nonresidential buildings, subject to discretionary review, to provide electric vehicle prewiring or conduit.
- Update zoning provisions to encourage alternative fuel stations.

Who's Responsible:

- County: Supports and promotes program
- Others: 870 households with a neighborhood electric vehicle (2% of homes), and 15 public EV charging stations

2020 GHG Reduction: -570 $MTCO_2e$

Community Benefits:

Protects Natural Resources

Improves Habitability

F2. Coordinate with the Butte County Air Quality Management District to adopt construction mitigation requirements for all construction projects.

Heavy construction equipment and machinery tend to be large GHG emitters as well as emitters of criteria air pollutants, which have health impacts on surrounding residents. Certain operating procedures can reduce engine running time without affecting productivity. This measure provides management practices to help construction equipment operators reduce fuel use and cut emissions.

Actions:

- Applicants for projects subject to discretionary review shall be encouraged to choose one of the following:
  - Reduce construction equipment idling to 3 minutes.
  - As practical, use clean or alternative fuel equipment.

Who's Responsible:

- County: Facilitates program
- Others: Half (50%) of new commercial equipment operated in the county to achieve a 40% reduction in idling time

2020 GHG Reduction: -500 $MTCO_2e$

Community Benefits:

Protects Natural Resources

Improves Public Health

Improves Habitability

F3. Implement programs and update standards for new residential development to support fuel efficiency in autos and lawn and garden equipment.

Although the fuel used by each resident and property owner to maintain their lawn and garden seems small, the cumulative impact across the county is large (over 17,000 $MTCO_2e$ per year in 2006). This measure provides actions to facilitate the purchase of more efficient fossil fuel or electric lawn and garden equipment, as well as to promote electric vehicle (EV) charging within private households.

Actions:

- Encourage electric vehicle outlets on external walls or in garages in all new residential development, subject to discretionary review.
- Simplify electrical permitting processes for electric vehicle charging.
- Work with the BCAQMD to provide an appliance trade-in program for residential lawn and garden equipment.

Who's Responsible:

- County: Promotes program and provides education

- Others: 4,210 lawn mowers and leaf blowers traded in for electric models (20% of lawn mowers and leaf blowers), and 340 households with an EV charging stations (2% of new households)

2020 GHG Reduction: -660 $MTCO_2e$

Community Benefits:

Protects Natural Resources

Improves Public Health

Improves Habitability

Transportation (T) Measures

Reduce work-related travel.

Transportation is the largest nonagricultural source of emissions in the county; a substantial portion of these emissions come from employee commutes. Although transportation is a large emissions sector, achieving emissions reductions in transportation is challenging in a large, dispersed rural community where residents and employees largely rely on autos for daily trips. The County has adopted General Plan policies to support more compact land use patterns and encourage alternative travel modes. Recognizing the challenges inherent to the transportation sector, this CAP supplements adopted General Plan policies and identifies one additional program to reduce emissions from work-related travel and resulting emissions.

T1. Create a transportation demand management program for businesses throughout Butte County composed of requirements for employers with more than 50 employees (large employers) and voluntary actions for smaller employers.

The County will encourage all large employers to implement a transportation demand management (TDM) program to reduce drive-alone trips and support ridesharing, public transit, walking, and bicycling. The County will recommend a suite of TDM strategies that each large employer may implement, including but not limited to transit subsidy passes, employer rideshare assistance, transit and bicycle subsidies, emergency ride home services, telecommute/flex commute options, and car- and bike-sharing solutions.

Actions:

- Work in collaboration with BCAG and local chambers of commerce to promote TDM strategies.
- Develop guidelines for Butte County that recommend appropriate TDM strategies for local businesses.
- Develop an informational brochure highlighting employer-based TDM strategies with available programs and provide as outreach to local businesses.
- Encourage existing employers and small employers to participate in TDM.
- Create an annual survey to track employee commute trends for all participating businesses.
- Connect employers with regional transit resources and partners, working with partners such as the Butte County Association of Governments (BCAG) and Butte Regional Transit.
- Provide facilities for carpooling and park and ride programs and facilities such as the park and ride lot adjacent to the Oroville Veterans Memorial Hall.

Who's Responsible:

- County: Monitors program, provides education, creates guidelines, and facilitates collaboration
- Others: 330 participating employees (4% of employees in the unincorporated county)

2020 GHG Reduction: -1,840 $MTCO_2e$

Community Benefits:

Protects Natural Resources

Promotes Business

Agriculture (AG) Measures

Support optimal agricultural practices that reduce greenhouse gas emissions.

Agriculture is an important GHG emissions source to be considered and quantified at the local, state, and federal levels. Nationwide, agricultural activities were the single largest source of all nitrous oxide (N_2O) emissions, contributing almost 68% of all N_2O. Further, agriculture contributes approximately 30% of all methane (CH_4) emissions nationwide.[6] (US Environmental Protection Agency 2011). The agricultural sector is also an important local leader in achieving emissions reductions, reducing emissions as part of business-as-usual practice. These changes have come as a practical response to changing demands, costs of supplies, and competitive economic decisions. Agricultural practices implemented to date have also resulted in significant GHG savings for the County, as outlined below. Quantifying GHG emissions reductions in this sector also underscores the importance of County efforts to preserve agricultural land, as the life cycle impact of an acre of agriculture land can be up to 100 times less GHG intensive as an acre of developed urban land.

With these optimal practices, agricultural production has been thriving. The total estimated gross value of agriculture production in Butte County for 2012 totaled $721,434,000, a $77.3 million-plus increase over the 2011 gross value. The 2012 year gross value also represents a 45% increase above the County 10-year average of $497,000,000.[7]

AG1. Implement best practices in rice farming.

Methane emissions from organic decomposition are generated in rice fields while they are harvested and drained, following flood-irrigation during the growing period. Numerous efforts are currently under way to better understand and reduce emissions associated with rice farming. The California Air Resources Board (CARB) is currently developing an emissions offset protocol for rice. Once adopted, the protocol would provide a method for farmers to verify and sell offset credits for implementing best practices that reduce emissions. Such a program could provide additional revenue for rice farmers. The US Department of Agriculture also operates a Rice Experiment Station to investigate and pilot new practices. These efforts

[6] US Environmental Protection Agency 2011. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2011. http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html.

[7] Butte County Office of Agricultural Commission Weights and Measures 2013. Butte County Agricultural Crop Report – 2012.

provide resources for Butte County rice farmers to learn more about improving crop practices while reducing emissions.

Actions:

- Collaborate with the USDA Rice Experiment Station to support best practices in rice farming.
- Monitor the state's efforts to develop an offset protocol for rice cultivation projects.
- Encourage the Butte County Rice Growers Association to promote optimal rice cultivation practices that maintain high yields and reduce GHG emissions.

Who's Responsible:

- County: Promotes best practices and provides information for farmers
- Others: Continue research and investigate new practices

2020 GHG Reduction: Supportive

Community Benefits:

Supports Agriculture

Protects Natural Resources

AG2. Reduce the amount of burned agricultural residue.

Agricultural burning is the practice of using fire to reduce or dispose of vegetative debris from an agricultural activity. Common agricultural burning practices include field-burning large areas of crop residue after harvest to reduce excess plant material, to control crop diseases, weeds, or pests, or to maintain crop yields; disposing of piles of agricultural debris (e.g., orchard trees, limbs, haystacks); and clearing vegetation from irrigation ditches and canals. In 2006, approximately 24,000 tons of material was burned in Butte County, primarily associated with orchards and rice. Since 2006, a reduction has already occurred based on changes in farming practices and crop types (e.g., increased chipping). This measure provides an opportunity to account for the associated GHG reductions from these changes, which are also anticipated to continue in future years.

Actions:

- Support BCAQMD permitting efforts to reduce residue burn.
- Connect agricultural operators to cost-effective chipping or other group options for disposing agricultural waste.
- Investigate interest and feasibility for development of centralized chipping programs in coordination with other green waste efforts at the Neal Road Recycling and Waste Facility.
- Encourage the processing of agricultural waste products into building materials and biofuels.

Who's Responsible:

- County: Supports BCAQMD, connects operators, and encourages less burning
- Others: 484 fewer tons of residue burned per year from almond and walnut acreage

2020 GHG Reduction: -790 $MTCO_2e$

Community Benefits:

Supports Agriculture

Promotes Business

Improves Public Health

AG3. Optimize the efficiency of water irrigation practices through clean, alternative irrigation energy sources.

There are approximately 500 diesel-powered pumps located throughout Butte County, which are used for water irrigation. In 2006, these pumps were responsible for approximately 28,000 $MTCO_2e$, making up almost 6.5% of the agriculture sector. Since 2006, use of solar-powered pumps has steadily increased in Butte County based on the number of permits issued. This measure provides an opportunity to account for pumps that have been converted since 2006, which is also anticipated to continue in future years as solar pumps become more affordable and practical.

Actions:

- Work with the BCAQMD to review the success of the countywide pump amnesty program.
- Develop a local amnesty program to register all agricultural pumps throughout the county and support BCAQMD efforts.
- Promote rebate opportunities for solar PV-powered pump equipment through the Farm Bureau and with other agricultural partners.

Who's Responsible:

- County: Supports BCAQMD, develops program, and promotes rebates
- Others: 120 agricultural pumps are converted from diesel to solar power

2020 GHG Reduction: -7,070 $MTCO_2e$

Community Benefits:

Supports Agriculture

Promotes Business

Reduces Energy Costs

AG4. Improve maintenance of agricultural vehicles to reduce fuel use.

Farm equipment is essential to various agricultural practices (e.g., plowing, planting, tilling). Most farm equipment is gasoline- or- diesel-fueled, and farm equipment in Butte County emitted approximately 74,000 $MTCO_2e$ in 2006, composing almost 17% of the agriculture sector. According to air district guidance in California, typical best management practices (e.g., maintaining equipment in proper working order) can result in a 5% reduction in emissions. This measure promotes and supports fuel efficiency in farm equipment resulting in both cost savings and GHG reductions.

Actions:

- Promote best practices in agricultural equipment maintenance.
- Collaborate with the BCAQMD to publicize rebates for improvements.
- Provide materials promoting the transition to consolidated farm equipment.

Who's Responsible:

- County: Promotes best practices and provides materials, collaborates with the BCAQMD
- Others: 50% of agricultural vehicle fleet improves fuel efficiency by 5%

2020 GHG Reduction: -1,860 $MTCO_2e$

Community Benefits:

Supports Agriculture

Promotes Business

Reduces Energy Costs

AG5. Implement best practices in fertilizer and pesticide use.

Fertilizer and pesticides are used to achieve desired plant growth and production. Their use results in approximately 100,000 $MTCO_2e$ per year, making up more than 23% of the agricultural sector. Since 2006, a reduction has already occurred in this subsector based on changes in farming practices. This measure provides the opportunity to account for the associated GHG reductions from these changes, which are also anticipated to increase in future years.

Action:

- Collaborate with stakeholders to support the efficient use of fertilizer.

Who's Responsible:

- County: Provides information and promotes program to farmers
- Others: Decrease fertilizer use by 1,330 fewer tons (5% from existing amounts)

2020 GHG Reduction: -4,660 $MTCO_2e$

Community Benefits:

Supports Agriculture

Improves Public Health

AG6. Develop a local carbon sequestration or offset program on agricultural and timber land.

CARB has adopted an offset protocol for livestock projects and is currently developing an offset protocol for rice cultivation. Offset protocols provide a method for farmers to sell verified offset credits for approved practices that reduce emissions. Credits could be sold in the state auction for the cap-and-trade, or through other offset programs such as the American Carbon Registry and the Climate Action Reserve. The County will also encourage local efforts to further incentivize GHG reductions through a local offset program. The County will work with the BCAQMD and other potential stakeholders to gauge local interest and feasibility. Such efforts would build on the state's offset protocol, working to further incentivize local agricultural operations to reduce GHG emissions.

Actions:

- Monitor opportunities for a local program, pending action by CARB.
- Investigate opportunities with the BCAQMD and agricultural stakeholders.

Who's Responsible:

- County: Support program development
- Others: Collaborate with County to investigate program feasibility

2020 GHG Reduction: Supportive

Community Benefits:

Supports Agriculture

Protects Natural Resources

Solid Waste (W) Measures

Reduce emissions from landfilled solid waste.

While waste disposal is an essential activity in the county, disposing solid waste also generates GHG emissions. The effects of landfilled waste can be reduced through technical advances in methane capture systems and a decrease in the amount of landfilled waste.

W1. Sustain a maximum practical methane capture rate at the Neal Road Recycling and Waste Facility.

The Butte County Public Works Department operates the Neal Road Recycling and Waste Facility, where most solid waste generated in Butte County is landfilled. GHG emissions occur in landfills as organic materials in the waste decompose and release methane. The LGOP estimates that the average US landfill captures approximately 75% of generated methane, allowing 25% to escape to the atmosphere. The County captures methane for energy generation, thus reducing methane that escapes to the atmosphere. This measure provides actions to continue aggressively capturing methane and to conduct a study that verifies the current capture rate.

As discussed in **Chapter 2**, the Neal Road Recycling and Waste Facility collects solid waste from incorporated and unincorporated communities in the county, as well as from some sources outside of the county. The community inventory and forecast accounts for emissions by landfilled waste originating from the unincorporated county. This reduction measure gives credit for the methane captured from those emissions. In contrast, measure GO9 captures full credit for all methane captured at the Neal Road Recycling and Waste Facility, including methane generated by waste from incorporated cities. This approach reflects the County's operational control of the entire landfill, regardless of the origin of waste.

Actions:

- Continue to monitor landfill gas emissions.
- Expand the collection system as needed to comply with provisions of the Landfill Methane Rule (AB 32).
- Extend the long-term landfill gas purchase agreement as appropriate at the conclusion of the current agreement.
- Research and develop conversion technology that results in increased capture of methane associated with organic waste.

Who's Responsible:

- County: Operates and maintains landfill gas purchase agreements, researches additional opportunities
- Others: Key partners support the County with research and pilot technologies

2020 GHG Reduction: -6,160 $MTCO_2e$

Community Benefits:

Expands Alternative Energy

W2. Adopt a countywide diversion rate target of 75%, consistent with state policy.

As mentioned in measure W1, decomposing landfilled waste emits methane, a potent GHG. Another way to reduce landfill-generated methane is to reduce the amount of waste being landfilled. AB 341(2012) sets a statewide policy target of a 75% diversion rate by 2013. Measure W2 adopts that target at the county level and recommends strategies to achieve it.

Actions:

- Adopt an ordinance identifying a 75% diversion rate target consistent with AB 341.
- Develop a program with haulers to track large waste generators.
- Under a voluntary program, certify facilities that are achieving or exceeding 50% waste diversion to achieve a 75% diversion rate by 2020.
- Support local facilities and programs that result in additional diversion of organic waste.

Who's Responsible:

- County: Adopts ordinance and supports programs to increase diversion rate
- Others: Key partners develop and implement effective programs

2020 GHG Reduction: -6,010 $MTCO_2e$

Community Benefits:

Protects Natural Resources

Government Operations (GO) Measures

Reduce energy use and optimize resource use in County operations and facilities.

The government operations focus area is the County's opportunity to lead by example. Emissions reduction measures may also reduce the cost of County operations by decreasing energy, fuel, and other materials consumed at County facilities.

GO1. Improve energy monitoring and tracking.

Energy costs are a substantial part of the County's annual budget. Currently, the County tracks electricity and natural gas use through several large accounts, and does not have a detailed understanding of energy use at the building or department level. A more detailed accounting describing where energy is used can enable the County to make better energy-efficiency retrofit decisions. This measure directs the County to install submeters on prioritized buildings and incorporate submeter results into the annual facility assessment process.

Actions:

- Develop a prioritized list of buildings to install submeters, prioritizing buildings with planned upgrades to allow for benchmarking and analysis of improvements.
- Consider a wide range of submeter technologies that facilitate optimal energy tracking.
- Develop a campus-wide plan for General Services to coordinate between all departments and install submeters at all County facilities as funding allows.
- Create an integrated Energy Management System (EMS) to meaningfully track energy use, analyze the costs and benefits of energy improvements, and inform the annual facility assessment process.

Who's Responsible:

- General Services: Implements actions, and provides support and education

2020 GHG Reduction: Supportive

Community Benefits:

Improves Habitability

Reduces Energy Costs

GO2. Improve operations with energy-efficient equipment.

This measure establishes a commitment to purchase cost-effective energy equipment when appropriate to reduce energy costs, energy consumption, and GHG emissions. Newer, more energy-efficient appliances and equipment can reduce maintenance costs and operate more efficiently than older models.

Actions:

- Adopt a revised procurement manual with a policy that requires consideration of energy-efficient options such as ENERGY STAR products when purchasing new equipment.
- Reduce the number of computer network servers by upgrading to virtual servers.
- Install automatic thermostat controls on facilities to help regulate building temperatures for diverse users.
- Install other automatic sensors to eliminate unnecessary energy use in energy and lighting, using technologies such as plug loads, occupancy sensors, and timers.

Who's Responsible:

- General Services: Adopts policies and carries out retrofits to 300,000 square feet (30% of County government space)
- Others: Support upgrades

2020 GHG Reduction: -260 $MTCO_2e$

Community Benefits:

Reduces Energy Costs

Improves Habitability

GO3. Improve heating and cooling functions of County buildings.

Inefficient HVAC systems and improperly sealed duct networks can increase the amount of energy required to heat and cool a building, and can potentially cause increased maintenance needs. This measure requires the County to identify inefficiencies and upgrade heating and cooling systems. The County has completed energy audits and is currently adjusting and optimizing the environmental management system in County buildings.

Actions:

- Identify buildings with inefficient heating and cooling systems to target for replacement, commissioning projects, or climate rezoning.
- Identify low-cost options to reduce space heater use and regulate building temperature.

- Adopt a policy to implement measures to improve HVAC systems and duct networks as feasible during other maintenance and improvement activities.

Who's Responsible:

- General Services: Implements actions and provides information
- Others: Support actions

2020 GHG Reduction: Supportive

Community Benefits:

Reduces Energy Costs

Improves Habitability

GO4. Implement fiscal and budgeting practices that improve energy efficiency.

The energy saved from conservation and efficiency efforts may result in savings on electricity and natural gas bills. The money saved can be used to fund further efficiency efforts. This measure establishes a process for the County to invest energy savings in further energy efficiency retrofits.

Actions:

- Each year during the County's budget development process, the General Services Department shall propose improvements to County facilities that achieve efficiency and reductions.
- Continue to implement energy-efficient improvements to County facilities in a manner that maximizes federal and state funding participation.

Who's Responsible:

- General Services: Recommends and implements actions
- Others: Support actions

2020 GHG Reduction: Supportive

Community Benefits:

Reduces Energy Costs

Improves Habitability

GO5. Implement habitability measures that cut costs.

Facility audits provide the County with information to invest in high-yield energy efficiency projects. This measure directs the County to audit facilities and invest in retrofit and other energy-efficiency projects, building on a 2011 energy audit of the government center campus that identified 19 actions with energy savings.

Actions:

- Work with utility providers to complete free to low-cost audits of County facilities and identify project opportunities.
- Adopt a policy that all roof maintenance shall include the use of energy-efficient and cool roof materials.

Who's Responsible:

- General Services: Facilitates program and provides educational opportunities
- Others: Support program

2020 GHG Reduction: Supportive

Community Benefits:

Reduces Energy Costs

Improves Habitability

GO6. Reduce fuel use in the County fleet.

Fuel used by the County vehicle fleet accounted for approximately 14% of 2006 government operations emissions. This measure identifies opportunities for the County to reduce fuel consumption through alternative fuel options for light- and heavy-duty vehicles and equipment, building on previous efforts such as the purchase of hybrid cars and reports on vehicle use.

Actions:

- Track options for alternative fuel vehicles and equipment.
- Continue to review options through the Fleet Committee.
- Implement CARB standards with replacement of the County's heavy-duty diesel vehicles (>14,000 lb).

Who's Responsible:

- Fleet Services Division: Supports and promotes reductions in fleet fuel use
- Others: 65,400 fewer gallons of fuel used annually by the County fleet in 2020

2020 GHG Reduction: -450 $MTCO_2e$

Community Benefits:

Reduces Energy Costs

Protects Natural Resources

GO7. Reduce emissions from employee commutes by encouraging alternative travel options and supporting the use of clean, alternative fuels.

The employee commutes and travel sector was the largest non-landfill contributor to 2006 government operations emissions (20% of total emissions). This measure identifies opportunities to reduce commute and travel emissions.

Actions:

- Conduct an annual survey to track employee commute patterns, and provide an award to departments with the highest percent participation in commuter or public transit programs.
- Consider meeting and conferring with employee groups to provide vouchers or subsidized bus passes to employees that use public transit or participate in carpool or commuter programs.
- Work with BCAG and the BCAQMD to identify available funding sources.
- Aim to provide at least one electric vehicle charging station at the County campus.

Who's Responsible:

- Development Services: Conducts surveys and promotes programs
- Human Services: Meets and confers about process
- Others: BCAG and BCAQMD support and participate in programs

2020 GHG Reduction: Supportive

Community Benefits:

Protects Natural Resources

GO8. Construct new buildings to CALGreen Tier 1 standards.

New County buildings have the potential to set an example for the community while saving energy for the life of the structure. This measure requires new County buildings to be more energy efficient than minimum code requirements, consistent with General Plan Policy COS-2.3, which requires new and renovated County buildings to meet green building standards.

Action:

- In addition to meeting LEED Silver standards (or equivalent) as required by General Plan COS-P2.3, new County facilities exceeding 3,000 square feet shall meet CALGreen Tier 1 standards for energy efficiency, a 15% improvement over minimum energy standards.

Who's Responsible:

- General Services: Implements and promotes standards in 60,000 square feet of building space (100% of new County facilities).

- Others: Support standards

2020 GHG Reduction: -10 $MTCO_2e$

Community Benefits:

Reduces Energy Costs

Protects Natural Resources

Improves Habitability

GO9. Reduce methane emissions from the Neal Road Recycling and Waste Facility.

This measure applies the GHG reduction benefits quantified in measure W1 to government operations. The reductions for government operations are larger than the community reductions because they include methane emissions from waste that originated in all areas of the county, including incorporated cities.

Action

- Set a goal to achieve a total methane capture rate of 90% at the Neal Road Recycling and Waste Facility.

Who's Responsible:

- Waste Management Division: Captures 90% of methane from the Neal Road facility
- Others: Support program

2020 GHG Reduction: -9,570 $MTCO_2e$

Community Benefits:

Reduces Energy Costs

Protects Natural Resources

GO10. Participate in a leadership or recognition program to promote and support County sustainability initiatives.

Through its innovative sustainability work, the County is in a position to act as a positive example for the community. Public information campaigns and awards for County accomplishments can raise community awareness of and prompt action to support sustainability.

Actions:

- Identify a no-cost program for the County to provide resources for energy efficiency, clean energy, and other sustainability efforts. Opportunities include the Beacon Award Program and the CoolCalifornia Challenge.
- Seek regional, statewide, and national recognition for the County's renewable energy projects in programs such as the US Environmental Protection Agency's Green Power Communities Program.

- Consider creation of an ongoing County Sustainability Team consisting of representatives from each department that will support CAP implementation.

Who's Responsible:

- General Services: Promotes County sustainability efforts
- Others: Support actions

2020 GHG Reduction: Supportive

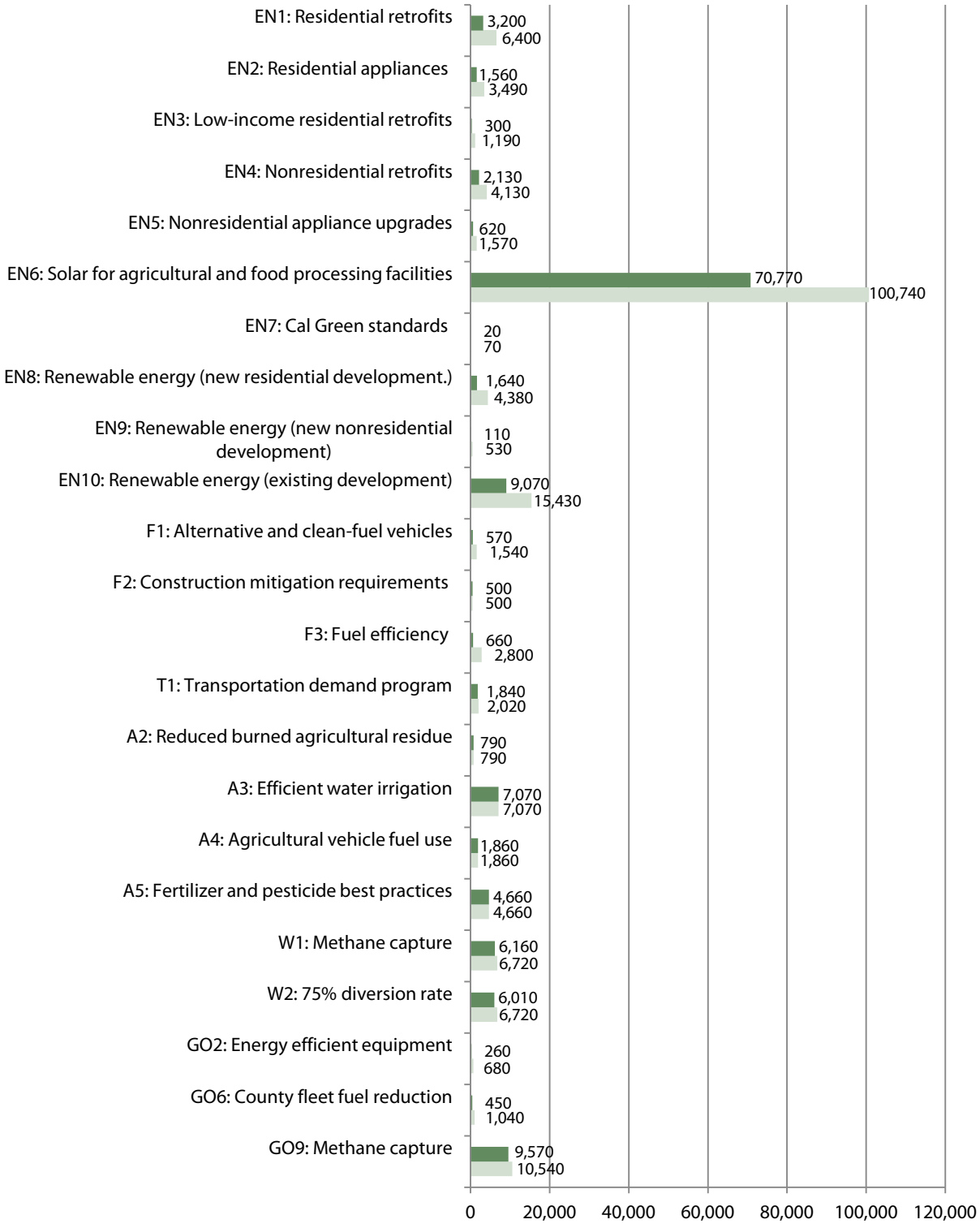
Community Benefits:

Improves Habitability

Progress to Goals

The County's General Plan calls for the County to set GHG reduction goals for 2020 and 2030 consistent with state guidance and to identify a strategy to achieve the 2020 goal. This chapter provides a policy framework that can achieve the County's 2020 target, setting a trajectory for future and continued emissions reductions. **Figure 12** summarizes GHG reductions by quantified measure for 2020 and 2030. Although it is not the focus of this CAP to close the 2030 gap, this information provides the County with a scope describing what needs to be accomplished. The CAP is projected to reduce 2030 community emissions by approximately 182,320 $MTCO_2e$, resulting in a new emissions forecast of 733,240 $MTCO_2e$. The County would still need to reduce 2030 emissions by approximately 201,460 $MTCO_2e$ to achieve an emissions level of 531,780 $MTCO_2e$ and maintain a trajectory toward California's 2050 emissions reduction goal.

Figure 12: 2020 and 2030 Community Emissions for Quantified Reductions by Measure ($MTCO_2e$)



Adapting to a Changing Climate

CHAPTER 5

Even with efforts to mitigate GHG emissions, it is likely that climate change will have substantial effects on precipitation, temperature, and weather patterns. Butte County's location and agricultural heritage make it critically important that the County prepare for future climate conditions. **Chapter 4** outlines a strategy to reduce emissions and contribute to the global effort to slow the rate of climate change. This chapter provides strategies enabling the county to thrive in a changing climate.

The adaptation strategy presented in this chapter was developed through a rigorous process that involved assessing vulnerability and vetting feasible and useful strategies, as described below. Key topics for adaptation measures were developed based on discussions with numerous County departments. Adaptation policy development is an iterative process that incorporates a range of inputs, identified in **Figure 13**. The County will implement the adaptation strategies and actions in this chapter using the work plan discussed in **Chapter 6**, which establishes time frames and responsible County departments or partners for each adaptation strategy.

Figure 13: Adaptation Policy Considerations

Adaptation (A) Measures

Butte County faces a number of current hazards and vulnerabilities that would be exacerbated under a changing climate. The adopted General Plan vision and policies support a Butte County with well-planned and resilient communities with adequate public services and facilities. Natural resources will be protected and enhanced, and the County's agriculture will continue to thrive. Hazards such as flooding and fire will be anticipated and minimized.

To ensure that the County can continue working toward this vision under a changing climate, the County will develop new strategies necessary to sustain resources and implement the General Plan. Adaptation measures are provided below to help Butte County prepare for and adjust to the effects of climate change. Examples include establishing cooling centers during heat waves, promoting energy efficiency and renewable energy to reduce peak load demand, and developing low-impact development standards to reduce stormwater runoff and increase groundwater recharge. The County will estimate the cost and benefit of each action and, if proven feasible, pursue each action when resources become available.

A1. Adapt to increasing wildfire frequency and severity.

Changes in precipitation (rain and snowfall), humidity, and temperature have the cumulative effect of increasing conditions where wildfires could occur with greater frequency and severity. As evidenced by the 2013 Swedes fire, Butte County has a large potential wildfire fuel source as well as homes, infrastructure, and business located within the wildland-urban interface. Through the following actions, the County seeks to gain a better understanding of wildfire vulnerability in future climate conditions and to increase the ability of structures, functions, and populations to adapt to changing conditions.

Actions:

- Monitor wildfire conditions and use wildfire projections to identify fuel reduction and fuel break sites in addition to those listed in the *Butte County Local Hazard Mitigation Plan* (LHMP).

- Engage key stakeholders, including local fire safe councils, to create and distribute educational materials about intensifying wildfire risks, wildfire risks in new areas, and risk reduction strategies.
- Amend the Zoning Ordinance to create a Fire Hazard Severity Overlay Zone with specific fuel break, defensible space, and on-site water requirements for California Office of Emergency Services (Cal OES)-designated high and very high fire hazard severity zones. Amend and re-adopt the overlay zone concurrent with CAL FIRE fire hazard severity zone updates.
- Integrate expected changes to fire hazard severity zones as a result of climate change into the *Butte Unit Community Wildfire Protection Plan*, the *Wildfire Mitigation Action Plan*, and the LHMP.

A2. Prepare for changing precipitation patterns and reduced water supply.

Changes in precipitation patterns may affect snowpack in the mountains to the east of the county as well as reduce groundwater recharge. Both of these effects can reduce access to drinking water and agricultural irrigation and could impact food processing operations, some of which are intense water users. Through education, efficiency, and conservation, the following adaptation actions help Butte County prepare for a future where water may be less plentiful and more expensive.

Actions:

- Collaborate with Northern Sacramento Valley Integrated Regional Water Management agencies to include climate change considerations in the *Integrated Regional Water Resource Management Plan* (IRWRMP). Monitor climate change effects on water resources and update future IRWRMPs accordingly.
- Support other agencies to help vulnerable populations conserve water and reduce household resource costs through income-qualified subsidies and rebates for water-efficient equipment upgrades including pump retrofits, low-flow toilets, and faucet aerators.
- Engage key stakeholders to create and distribute educational materials that identify water sources and explain the relationship between groundwater levels and snowpack, and the costs and reliability of water.
- Include climate change considerations in the drought section of LHMP updates.
- Work with agricultural water providers to prioritize groundwater pump energy efficiency and promote conservation efforts.
- Collaborate with water providers to incorporate anticipated water supply changes that may result from reduced snowpack and lower groundwater levels into agricultural management plans. Include plans for flood irrigation serving rice crop areas south of Nelson, and groundwater sources that supply drip irrigation practices west of Chico.

A3. Anticipate increases in flooding frequency and severity.

Even though overall precipitation levels may decline under future climate conditions, it is likely that precipitation events that do occur will be more extreme. With foothills in the east draining into a large valley in the west, Butte County is already vulnerable to flooding. Increases in extreme precipitation events are likely to affect the county's most vulnerable populations and the economy through flooding and may additionally increase erosion in the long term. The actions below can make Butte County more resilient to increases in flooding frequency and severity.

Actions:

- Include anticipated flooding increases in the County's National Flood Insurance Program regulatory activities for new and existing structures and drainage system maintenance.
- Include anticipated flood increase considerations in public outreach activities, including information about the stormwater management program, National Pollutant Discharge Elimination System (NPDES), and information related to the maintenance of drainage systems.
- Amend development standards to require stormwater management infrastructure in all new development, including but not limited to impervious pavement lot-coverage maximums, on-site water retention requirements, grey water storage requirements, and other Low Impact Development (LID) techniques.
- Develop a Lake Oroville flooding evacuation plan that anticipates changing risks from a decrease in the Sierra snowpack and an increase in more severe rainfall events.

A4. Prepare and quickly respond to more frequent and intense extreme heat events.

As the climate continues to change, extreme heat events are likely to occur more frequently and last longer. Heat affects Butte County in multiple ways including effects on agricultural production, stressors to disadvantaged populations with limited access to reliable cooling, and through the generation of troposphere ozone in the more urbanized areas of the unincorporated county. The following actions will help the County respond to and recover quickly from extreme heat events.

Actions:

- Incorporate anticipated extreme heat event severity and frequency into annual updates of the *Butte County Emergency Operations Plan* Excessive Heat Hazard Appendix.
- Work with community organizations to provide cooling centers during extreme heat events.
- Support attainment of ambient air quality standards to prevent tropospheric ozone and related public health problems.
- Reduce heat islands in urbanized unincorporated communities using high-albedo pavements, cool roofs, and tree requirements for public facilities maintenance, capital improvements, and new development.
- Work with partners to prioritize and leverage greening and forestry grants for urbanized unincorporated communities.

Resiliency (R) Measures

While the previous section provided actions to adapt to specific changes, this section identifies how agricultural, ecological, and economic sectors can begin to prepare for climate change.

R1. Enhance the economic viability of local agriculture in a changing climate.

Agriculture is the heart of Butte County's heritage and economy. Maintaining the economic viability of agriculture is critical to the continued health of the county. More so than in other economic sectors, agricultural success is deeply rooted in prevailing climate conditions. Changes to water access, growing season length, and weed and pest populations are examples of a large list of changes the agricultural community may face under a changing climate. The following actions seek to provide resources to the

agricultural community to make informed decisions about the future. The actions also identify secondary revenue streams and expand markets to provide Butte County farmers additional opportunities to maintain the critical services they provide.

Actions:

- Provide adaptation information to the farming community using Yolo County's agricultural adaptation website as a model (http://agadapt.ucdavis.edu/). Work with regional agricultural organizations to develop and distribute materials. At a minimum, include information about climate change effects on pests, weeds, water, and growing seasons.
- Work with regional farming organizations to develop and provide risk reduction best practices for anticipated changes such as more resilient pests, new weeds, reduced water availability, and altered growing seasons.
- Encourage efficient irrigation techniques (e.g., drip lines) and financial resources to support installation (e.g., revolving loans, low interest financing, information about return on investment).
- Provide educational and financial assistance for farmers to transition to profitable drought-resilient hardy crop types.
- Promote and support secondary revenue streams to support a strong, sustained agricultural sector including carbon offsets, agritourism, renewable energy siting, and biomass energy generation.
- Develop and support local agriculture markets via a "Buy Butte" campaign that designates local produce and enhances the local market.
- Facilitate agreements between local agricultural distributors and local schools, low-income food providers, institutions, nonprofits such as the GRUB education program, universities, and large employers to maximize access to local healthy foods.
- Provide information to low-income food benefit recipients explaining eligibility of benefits at local farmers markets.

R2. Support resilient ecosystems.

Butte County has a diverse and vibrant ecosystem. As ecosystems face stressors from climate change, it is important that species and communities have the opportunity to move to areas where they can thrive. The action provided below facilitates adaptive migration by incorporating climate change considerations into future updates of the *Butte Regional Conservation Plan*.

Action:

- Work with BCAG to incorporate anticipated changes to habitat and migration corridors into updates of the *Butte Regional Conservation Plan*.

R3: Sustain a thriving economy that capitalizes on changing conditions.

Just as agriculture faces distinct challenges in a changing climate, the rest of Butte County's economy also faces numerous challenges. Actions provided below help develop an alternative energy workforce and maintain the economic viability of the region's premier recreation resource, the Lake Oroville State Recreation Area.

Actions:

- Maintain agriculture as the economic base of the county (see agriculture policies).
- Work with Butte College and CSU Chico and pursue grant funding to support energy contractor certification. Develop a skilled alternative energy workforce that enhances local industry and the local economy.
- Work with state parks to update the *Lake Oroville State Recreation Area General Plan* with anticipated changes to lake conditions.
- Participate in an economic development study for the Lake Oroville State Recreation Area that focuses on diverse economic attractors and maximizes economic resiliency.

Government Resiliency (GR) Measures

Just as the GHG reduction strategy in this CAP focuses on the community in general and government operations specifically, this chapter provides additional actions to increase County government's ability to adapt to climate change effects. The actions below provide a strategy to increase the resiliency of government operations as well as increase the government's ability to provide adaptation support to the unincorporated community.

GR1. Account for climate change effects in existing government operations.

Operational measures to address climate change assess climate change vulnerabilities and sensitive populations on a regular basis. They also address climate change adaptation in planning and public safety documents. The County will integrate climate considerations into current practices to ensure ongoing consideration and evaluation of new and future risks, and include anticipated changes in extreme events (e.g., expected increase in extreme heat days, wildfires, flooding) in appropriate plans, policies, and programs as they are updated.

Actions:

- Draw on the recently completed hazards vulnerability assessment in the County's 2013 Local Hazard Mitigation Plan (LHMP) to prepare a comprehensive climate change vulnerability assessment that analyzes anticipated future vulnerabilities based on the changing impacts of climate change.
- Update the climate change vulnerability assessment concurrently with future LHMP vulnerability assessments to ensure the County is analyzing both historic and future vulnerabilities.

GR2. Work with partners to prepare for climate change.

In coordination with other jurisdictions, agencies, and partners, the County can work more effectively to identify resources and approaches to respond to climate change. Regional coordination also supports more informed decision-making that minimizes hazards and protects vulnerable resources.

Actions:

- Partner with neighboring jurisdictions and regional entities to create an ongoing monitoring program that tracks local and regional climate change effects and adaptation efforts and outcomes.
- Leverage multi-benefit funding sources such as federal hazard mitigation grants.
- Identify partnerships, funding programs, and opportunities for assessing changing risks, such as partnerships with Chico State Institute for Sustainable Development, Butte College, and local nonprofit groups.

Work Plan

CHAPTER 6

Achieving the greenhouse gas (GHG) reduction goal by 2020 is a challenging task requiring a coordinated work effort. This chapter presents the County's work plan to achieving emissions reduction and adaptation goals, monitor implementation, and demonstrate progress. Recognizing that this Climate Action Plan (CAP) is a strategic plan that may evolve over time, this work plan provides an initial framework and a means for County staff to revisit CAP measures and respond to new opportunities or successes.

Work Plan

The County will integrate CAP measures and actions into existing policies and programs, including revising other local and regional plans, developing new programs, and initiating new activities. County staff will also implement new steps to maintain this CAP as a useful tool, as described below.

Implementation

Measures and actions in the CAP identify amendments to existing codes, policies, and documents or programs. As the County moves forward with Zoning Ordinance updates, specific plans, Housing Element updates, and other planning documents, staff will ensure that these documents support and are consistent with the CAP. Existing regional partnerships and collaborations can also support implementation. County staff will maintain these existing networks and support programs and resources that reduce emissions and enhance local quality life. Ongoing collaboration may also yield new funding or staff resources that can be leveraged to provide regional benefit. Recognizing the importance of responsible stewardship, County staff

will seek to maximize the benefit of limited resources by working closely with Butte County cities and regional agencies.

The Butte County Department of Development Services (DDS) will act as the lead agency to implement the CAP. DDS staff will report on CAP progress annually to the Board of Supervisors in conjunction with the General Plan Annual Report process, initiate and lead tasks assigned to the department, and support implementation efforts of other County agencies. The CAP identifies ambitious and collaborative tasks requiring support of numerous departments, regional agencies, and private-sector partners. DDS will lead coordination between these agencies on an ongoing and regular basis.

The CAP represents a near-term strategy to implement the General Plan. To continue serving as a meaningful tool, standard practice recommends revisiting and updating a CAP, including the GHG emissions inventory, every five years. DDS will coordinate these updates, based on evolving state guidance, staff resources, and progress.

Monitoring and Updating Progress

To demonstrate progress toward plan goals, the County will use a monitoring and reporting tool. Using the same technical data that informed development of the CAP, the tool will allow County staff to evaluate CAP progress using quantitative data and qualitative progress information. The monitoring and reporting tool estimates emissions changes in the unincorporated county year-by-year using publicly available activity data and tracks progress for each measure, including initiation dates and key metrics.

Certain measures may exceed expectations and provide more cost-effective options to reduce emissions. Other measures may not meet anticipated reductions. DDS will use the monitoring and reporting tool to provide updates to decision-makers in order to reassess funding decisions and allocation of staff time. Annual updates using the monitoring and reporting tool also allow the County to reduce the need for a full re-inventory of GHG emissions to evaluate progress.

Next Steps

Attaining CAP reduction goals will require County leadership to execute measures and report progress. Recognizing the numerous entities involved in CAP implementation and diversity of work priorities, the County has prepared a work plan identifying responsible departments and key implementation considerations for each CAP measure. The work plan will be established by separate resolution of the Board of Supervisors, and may be revised or updated independent of an amendment to the CAP. Each work plan consideration is described below.

- **Time frame:** The year by which a measure should be initiated to achieve targeted GHG emissions reductions in 2020, support adaptation to climate change effects, or achieve long-term resilience. Time frames are described as follows:
  - Immediate (by 2014)
  - Near-Term (by 2016)
  - Mid-Term (by 2018)
  - Long-Term (by 2020)

- **Lead agency:** The lead County department tasked with implementing the measure.
- **Additional agencies:** Other supportive agencies or partners that play a role in implementing the measure.
- **Staff time:** An estimate of the likely expense and staff time required to implement the measure. The County can use this information to help determine if a measure is the best use of County resources. Three cost ranges have been identified, as described below.

Range	Description	Staff Hours
$ Low	Minimal staff effort and no consultant assistance would be needed to complete analytical work, coordinate stakeholder/public outreach, or implement the program.	<80
$$ Medium	Significant staff effort, some consultant assistance, or supplemental funding for operations or capital projects would be needed to complete analytical work, coordinate stakeholder/public outreach, or implement the program.	80–500
$$$ High	Major staff effort, consultant assistance, or supplemental funding for operations or capital projects would be needed to complete analytical work, coordinate stakeholder/public outreach, or implement the program.	500+

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Key Terms

Adaptive Capacity – The ability of a population to prepare for or react to the long-term impacts of climate change, including increased frequency and severity of disasters. Lower-income and institutionalized populations may have limited adaptive capacity due to lower access to necessary resources. Also see "Resiliency," which refers to a system's ability to respond to a particular event, whereas "Adaptive Capacity" refers to a system's more general ability to adapt to climate change impacts.

California Environmental Quality Act (CEQA) – A state law requiring state and local agencies to regulate activities with consideration for environmental protection. If a proposed activity has the potential for a significant adverse environmental impact, an environmental impact report (EIR) must be prepared and certified as to its adequacy before action can be taken on the proposed project. General plans require the preparation of a program EIR.

California Green Building Standards Code (CALGreen) – The 2010 California Green Building Standards Code, commonly referred to as the CALGreen Code, is a statewide mandatory construction code that was developed and adopted by the California Buildings Standards Commission and the Department of Housing and Community Development. The CALGreen standards require new residential and commercial buildings to comply with mandatory measures under the topics of planning and design, energy efficiency, water efficiency and conservation, material conservation and resource efficiency, and environmental quality. CALGreen also provides voluntary tiers and measures that local governments may adopt that encourage or require additional measures in the five green building topics.

California Solar Initiative (CSI) – Allows the California Public Utilities Commission to provide incentives to install solar technology on existing residential, commercial, nonprofit, and governmental buildings if they are customers of the state's investor-owned utilities.

Carbon Dioxide Equivalent (CO_2e) – A metric measure used to compare the emissions from various greenhouse gases based on their global warming potential (GWP). The carbon dioxide equivalent for a gas is derived by multiplying the tons of the gas by the associated GWP.

Clean Car Fuel Standards (AB 1493, Pavley) – Signed into law in 2002 and commonly referred to as Pavley standards. Requires carmakers to reduce GHG emissions from new passenger cars and light trucks beginning in 2011. The California Air Resources Board anticipates that the Pavley standards will reduce emissions from new California passenger vehicles by about 22% in 2012 and about 30% in 2016, all while improving fuel efficiency and reducing motorists' costs.

Community Benefits – An additional benefit occurring from the implementation of an emissions reduction measure that is not directly related to reducing GHG emissions.

Complete Streets - Complete Streets policies ensure that transportation planners and engineers consistently design and operate the entire roadway with all potential users in mind. This includes bicyclists, public transportation vehicles and riders, and pedestrians of all ages and abilities. In 2007, the

State of California adopted Assembly Bill 1358, which directs the legislative body of a city or county, upon revision of the circulation element of its general plan, to identify how the jurisdiction will provide for the routine accommodation of all users.

Construction and Demolition Waste (C&D) – C&D materials consist of the waste generated during the construction, demolition, or renovation of buildings, roads, and other construction projects. C&D materials may include heavy, bulky materials such as concrete, glass, wood, and metal, among other materials.

Cool Roof – A roof with high solar reflectivity is considered a cool roof. Cool roofs reduce heat transfer into the indoors and can reduce indoor energy demand.

Energy Conservation – Reducing energy, by turning off lights and heating when not in use.

Energy Efficiency – Doing the same or more work with less energy, such as replacing incandescent light bulbs with compact fluorescent light bulbs or buying an ENERGY STAR appliance to use less energy for the same or greater output.

ENERGY STAR – A program to provide consumers with information and incentives to purchase energy-efficient products and develop energy-efficient buildings, jointly managed by the US Environmental Protection Agency and the US Department of Energy.

Global Warming Potential (GWP) – An index used to translate the level of emissions of various gases into a common measure in order to compare the relative potency of different gases without directly calculating the changes in atmospheric concentrations. GHGs are expressed in terms of carbon dioxide equivalent. GWPs are expressed in terms relative to carbon dioxide, which has a global warming potential of one.

Greenhouse Gas(es) (GHG) – Gases which cause heat to be trapped in the atmosphere, warming the earth. GHGs are necessary to keep the earth warm, but increasing concentrations of these gases are implicated in global climate change. GHGs include all of the following gases: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The majority of GHGs come from natural sources, although human activity is also a major contributor.

Green Waste – Refers to lawn, garden, or park plant trimmings and materials and can be used in home-composts or picked up curbside by municipal waste haulers.

Grey Water – See Recycled Water.

LEED – Leadership in Energy and Environmental Design, a standard established by the US Green Building Council.

Mixed Use – Properties on which various uses such as office, commercial, institutional, and residential are combined in a single building or on a single site in an integrated development project with significant functional interrelationships and a coherent physical design. A single site may include contiguous properties.

Neighborhood Electric Vehicle (NEV) – Small, street-legal electric vehicles with a limited top speed, suitable for traveling short distances.

Ordinance – A law or regulation set forth and adopted by a governmental authority, usually a city or county.

Property Assessed Clean Energy (PACE) program – A voluntary program allowing on-site renewable energy generation and energy efficiency improvements to be financed through property taxes.

Recycled Water – Treatment of wastewater to a quality suitable for non-potable uses such as landscape irrigation; not intended for human consumption.

Reduction Measure – A goal, strategy, program, or set of actions that target and reduce a specific source of GHG emissions.

Renewable Energy – Energy from sources that regenerate and are less damaging to the environment, such as solar, wind, biomass, and small-scale hydroelectric power.

Renewables Portfolio Standard (RPS) – A regulation requiring utility companies in California to increase the production of renewable energy from solar, wind, or biomass, or from geothermal sources.

Resiliency – The ability of a community, natural resource, or system to anticipate, absorb, accommodate, or recover from the effects of a potentially hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions.[8]

Sustainability – Community use of natural resources in a way that does not jeopardize the ability of future generations to live and prosper.

Transportation Demand Management (TDM) Plan – A program developed by local agencies, large employees, or high traffic commercial services to reduce the amount of congestion and pollution related to transportation demand. TDM plans may be voluntary or mandatory, and may include incentives, regulations, and education about transportation alternatives.

Vehicle Miles Traveled (VMT) – A key measure of overall street and highway use. Reducing VMT is often a major objective in efforts to reduce vehicular congestion and achieve regional air quality goals.

Water Conservation – Reducing water use, such as turning off taps, shortening shower times, and cutting back on outdoor irrigation.

Water Efficiency – Replacing older technologies and practices in order to accomplish the same results with less water; for example, by replacing toilets with new low-water-using models and by installing "smart controllers" in irrigated areas.

[8] Intergovernmental Panel on Climate Change. 2012. Climate Change: New Dimensions in Disaster Risk, Exposure, Vulnerability, and Resilience. Retrieved September 30, 2013. http://ipcc-wg2.gov/SREX/images/uploads/SREX-Chap1_FINAL.pdf.

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Appendix A: General Plan Cross References

Table A-1 presents primary General Plan goals, policies, and actions that support or are directly implemented by the Climate Action Plan (CAP) measures. This table demonstrates the close relationship of the CAP to the General Plan. The CAP serves as an implementation tool of the numerous actions vetted and adopted through the General Plan process.

Table A-1: CAP Measures and Related General Plan Policies and Actions

Measure		General Plan Policy or Action
EN1	Connect homeowners to financing and resources for retrofits.	H-A6.1, H-A6.2, H-A6.3, COS-A1.3
EN2	Promote residential appliance upgrades.	H-A6.2, H-06.1
EN3	Connect low-income homeowners to financing and resources for retrofits.	COS-A1.3, H-P6.2, H-A6.2, H-06.1
EN4	Support retrofits in existing nonresidential uses with an emphasis on manufacturing facilities.	COS-A1.3, H-A6.1, H-AS.3, H-A6.4, COS-A1.3
EN5	Work with utility providers to encourage nonresidential appliance upgrades.	COS-P4.1
EN6	Promote energy-efficiency programs and streamline on-site solar PV installations for agricultural and food processing facilities to improve operations and profitability.	COS-A2.2, COS-P4.1
EN7	Encourage new nonresidential buildings to meet and exceed CALGreen standards for energy efficiency, water conservation, and passive design.	COS-P2.1, COS-P2.2, COS-P2.4, COS-A2.1, COSA2.2, COS-A2.3, COS-A2.4, COS-A2.5
EN8	Expand distributed generation, renewable energy systems for new residential development.	COS-P1.2, COS-P2.4, COS-P3.4, COS-P3.5, COSP3.7, COS-P4.3, COS-A2.5
EN9	Support distributed generation in new nonresidential development to reduce on-site energy use.	COS-P3.2, COS-P3.4, COS-P3.7, COS-A2.5
EN10	Encourage the voluntary installation of distributed generation, renewable energy systems throughout the county.	COS-P3.2, COS-P3.4, COS-P3.7
EN11	Adopt a solar PV energy overlay zone.	COS-P3.2, COS-P3.4, COS-P3.7, COS-A3.1
F1	Expand the use of alternative and clean-fuel vehicles.	COS-P1.5, COS-P1.7

Measure		General Plan Policy or Action
F2	Coordinate with Butte County Air Quality Management District to adopt construction mitigation requirements for all construction projects.	COS-A1.5
F3	Implement programs and update standards for new residential development to support fuel efficiency in autos and lawn and garden equipment.	COS-P1.5, COS-P1.7
T1	Create a transportation demand management program for businesses throughout Butte County composed of requirements for employers with more than 50 employees (large employers) and voluntary actions for smaller employers.	CIR-P2.1, CIR-P2.2, CIR-P2.4, CIR-P3.1, CIR-P3.3, CIR-P3.4, CIR-P3.5, CIR-P3.8, CIR-A3.1, CIR-P4.1, CIR-P4.2, CIR-P4.3, CIR-P4.3, CIR-P4.3, CIR-A4.1
AG1	Implement best practices in rice farming.	
AG2	Reduce the amount of burned agricultural residue.	
AG3	Optimize the efficiency of water irrigation practices through clean, alternative irrigation energy sources.	AG-P3.1, AG-P6.2, W-P4.1, W-P4.2, W-P4.3, W-A4.2
AG4	Improve maintenance of agricultural vehicles to reduce fuel use.	
AG5	Implement best practices in fertilizer and pesticide use.	AG-P4.4, AG-P3.2, W-P1.5
AG6	Develop a local carbon sequestration or offset program on agricultural and timber land.	ED-P2.6, COS-P1.6
W1	Sustain a maximum practical methane capture rate at the Neal Road Recycling and Waste Facility.	COS-A1.7, PUB-A9.2
W2	Adopt a countywide diversion rate target of 75%, consistent with state policy.	COS-P1.6, PUB-P11.2, PUB-P11.1, PUB-P9.1, PUB-P11.1 -PUB.P11.5, PUB-A11.1
GO1	Improve energy monitoring and tracking.	
GO2	Improve operations with energy-efficient equipment.	
GO3	Improve heating and cooling functions of County buildings.	COS-A4.4
GO4	Implement fiscal and budgeting practices that improve energy efficiency.	
GO5	Implement habitability measures that cut costs.	COS-P2.3, COS-P3.6, COS-A4.4, PUB-P1.2
GO6	Reduce fuel use in the County fleet.	COS-A1.2, COS-P1.7, COS-A1.4
GO7	Reduce emissions from employee commutes by encouraging alternative travel options and supporting the use of clean, alternative fuels.	CIR-P2.2, CIR-P2.4, CIR-P4.1, CIR-P4.2
GO8	Construct new buildings to CALGreen Tier 1 standards.	COS-P2.3
GO9	Reduce methane emissions from the Neal Road Recycling and Waste Facility.	COS-A1.7, PUB-A9.2

Measure		General Plan Policy or Action
GO10	Participate in a leadership or recognition program to promote and support County sustainability initiatives.	COS-P2.1
A1	Adapt to increasing wildfire frequency and severity.	COS-A11.1, HS-P11.2, HS-11.4, HS-12.2, HS-12.2, HS-A12.1, HS-A13.1
A2	Prepare for changing precipitation patterns and water supply.	AG-P3.1, AG-P6.2, W-P2.1, W-P2.3, W-P3.1, W-P3.2, W-P3.3, W-A3.1, W-A3.2, W-A3.4, W-P4.3, W-P4.4, COS-P8.2, HS-P10.2
A3	Anticipate increases in flooding frequency and severity.	HS-P2.1, HS-P2.6, HS-A2.1, HS-A2.2, HS-P4.3
A4	Prepare and quickly respond to more frequent and intense of extreme heat events.	
R1	Enhance the economic viability of local agriculture in a changing climate.	ED-P2.1, ED-P2.3, AG-P2.6, AG-P3.1, W-P3.2
R2	Support resilient ecosystems.	COS-P7.10, COS-P7.2, COS-P7.4
R3	Sustain a thriving economy that capitalizes on changing conditions.	ED-P1.1, ED-P1.3, ED-P2.3, ED-P2.6, ED-A1.1, ED-A1.2, ED-A1.3
GR1	Account for climate change effects in existing government operations.	W-P3.1, W-P3.3, W-P4.7, COS-A1.1, COS-P2.3, COS-A4.3, COS-P7.10, HS-A2.2, PUB-P1.2
GR2	Work with partners to prepare for climate change.	W-A3.4, H-A6.2, AG-P3.1, AG-P6.2, W-P4.2

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Appendix B: Technical Reports

Community Inventory

Community Baseline Activity Data

Activity data was obtained from utility providers, state agencies, and County staff to determine the extent to which each activity occurs annually. This activity data was used to calculate GHG emissions for 2006. **Table B-1** lists the activity data used in the 2006 baseline inventory analysis along with activity data, units, and sources. Data sources include Pacific Gas and Electric (PG&E), the Local Government Operations Protocol (LGOP), the US Department of Housing and Urban Development (HUD), the California Department of Resources Recycling and Recovery (CalRecycle), and the California Energy Commission (CEC).

Table B-1: Community Baseline Inventory Activity Data

Sector	Activity Type	2006 Activity Data	Unit of Measure	Source
Residential Energy	Residential Electricity	356,249,430	kWh	PG&E, LGOP
	Residential Natural Gas	8,038,880	Therms	PG&E, LGOP
	Residential Propane	5,960,640		2006 American Community Survey; ICF Propane model
Commercial/ Industrial Energy	Commercial/Industrial Electricity	175,839,820	kWh	PG&E, LGOP
	Commercial/Industrial Natural Gas	4,423,250	Therms	PG&E, LGOP
	Direct Access Electricity	3,130,490	kWh	PG&E
On-Road Transportation	On-Road Transportation	464,302,660	VMT	BCAG
Waste	Waste – Solid Waste	66,470	Tons of Waste	CalRecycle
Off Road	Lawn & Garden	1,890	$MTCO_2e$	CARB OFFROAD Model
	Construction	564	New Households	CARB OFFROAD Model, California Department of Finance
Water	Indirect Water Emissions	21,065,457	Electricity (kWh)	CEC, LGOP
Wastewater	Direct Emissions	7,760	$MTCO_2e$	Butte County, LGOP

Sector	Activity Type	2006 Activity Data	Unit of Measure	Source
	Indirect Electricity	997,253	Electricity (kWh)	Butte County, LGOP
Agriculture	Residue Burning	183,357	Acres Burned	Butte County
	Livestock	29,906	Head of Livestock	Butte County
	Rice Cultivation	105,673	Acres	Butte County
	Farm Equipment	20,719	Gallons/Day	Butte County
	Agricultural Irrigation Pumps	487	Number of Pumps	Butte County
	Pesticide Application	9,765	Pounds	Butte County, California Department of Pesticide Regulation
	Fertilizer	29,091	Tons	Butte County, California Department of Food and Agriculture
	Lime Application	6,380	Tons	Butte County, California Department of Food and Agriculture
	Urea Fertilization	4,877	Tons	Butte County, California Department of Food and Agriculture
Landfill	Waste in Place	2,624,150	Tons of Waste in Place	General Plan EIR, Appendix F, CalRecycle

Table B-2 identifies the emissions factors used to translate activity data into GHG emissions for the community baseline inventory. When a specific emissions coefficient is not applicable, the total emissions reported are given for reference.

Table B-2: Community Baseline Inventory Emissions Coefficients

Activity Type	2006 Coefficient		Sources
Residential Electricity	0.000208	$MTCO_2e$ per kWh	PG&E, LGOP
Residential Natural Gas	0.0053	$MTCO_2e$ per therm	LGOP
Residential Propane	0.0056	$MTCO_2e$ per lb	LGOP
Commercial/Industrial Electricity	0.00021	$MTCO_2e$ per kWh	PG&E, LGOP
Commercial/Industrial Natural Gas	0.0053	$MTCO_2e$ per therm	LGOP
Direct Access Electricity	0.00041	$MTCO_2e$ per kWh	LGOP
On-Road Transportation	0.00057	$MTCO_2e$ per VMT	EMFAC 2011
Waste – Solid Waste	0.21	$MTCO_2e$ per ton of waste	CARB Landfill Tool

Activity Type	2006 Coefficient		Sources
Off-Road – Lawn & Garden	1,890	$MTCO_2e$	CARB OFFROAD
Off-Road – Construction	15,470	$MTCO_2e$	CARB OFFROAD
Indirect Water Emissions	0.46	$MTCO_2e$	LGOP
Wastewater – Direct Emissions	7,760	$MTCO_2e$ per million gallons	LGOP
Wastewater – Indirect Electricity	997,250	$MTCO_2e$ per electricity (kWh)	LGOP
Agriculture – Residue Burning	183,360	$MTCO_2e$ per acres burned	CARB
Agriculture – Livestock	29,910	$MTCO_2e$ per head of livestock	CARB
Agriculture – Rice Cultivation	105,680	$MTCO_2e$ per acres	CARB
Agriculture – Farm Equipment	20,720	$MTCO_2e$ per gallons/day	CARB
Agriculture – Agricultural Irrigation Pumps	490	$MTCO_2e$ per number of pumps	CARB
Agriculture – Pesticide Application	9,770	$MTCO_2e$ per pounds	CARB
Agriculture – Fertilizer	29,090	$MTCO_2e$ per tons	CARB
Agriculture – Lime Application	6,380	$MTCO_2e$ per tons	CARB
Agriculture – Urea Fertilization	4,880	$MTCO_2e$ per tons	CARB

Government Operations Inventory

Government Operations Baseline Activity Data

Baseline activity data used in the government operations baseline inventory is provided in **Table B-3**.

Table B-3: Government Operations Baseline Activity Data

Sector	Subsector	Activity Data	Unit	Source
Buildings	Electricity	13,310,574	kWh	PG&E, County Records
	Natural Gas	577,562	Therms	PG&E, County Records, LGOP
Fleet	Gasoline	276,340	Gallons	LGOP, County Records
	Diesel	195,390	Gallons	LGOP, County Records
Landfill	Direct Emissions	13,700	$MTCO_2e$	CalRecycle, County Records
Lighting	PG&E Streetlights	285,299	kWh	PG&E, County Records
	Butte County Streetlights	12,240	kWh	PG&E, County Records
	Traffic Lights	31,987	kWh	PG&E, County Records
Water	Water Electricity	21,443	kWh	Butte County Sustainability

Sector	Subsector	Activity Data	Unit	Source
				Report
Employee Commute & Travel	Employee Travel	15,150	Miles Traveled	Travel Survey
	Employee Commute	15,082,190	VMT	Travel Survey
Government-Generated Solid Waste	Tons Disposed	20	Tons	Butte County Sustainability Report

Table B-4 identifies the emissions factors used to translate activity data into GHG emissions for the government operations baseline inventory. When a specific emissions coefficient is not applicable, the total emissions reported are given for reference.

Table B-4: Government Operations Baseline Inventory Emissions Coefficients

Activity Type	Applicable Indicator	2006 Coefficient		Source
Building Electricity (kWh)*	Building Area or Employment	0.00208	$MTCO_2e$ per kWh	LGOP
Building Natural Gas (therms)	Building Area or Employment	0.00532	$MTCO_2e$ per Therm	LGOP
Gasoline	City Employment	2,280	$MTCO_2e$	EMFAC 2011
Diesel	City Employment	2,060	$MTCO_2e$	EMFAC 2011
Tons of Waste in Place	Service Population	13,700 MTCO2e	$MTCO_2e$	CARB Landfill Tool
Streetlights*	City Employment	0.00263	$MTCO_2e$ per kWh	LGOP, PG&E
Traffic Lights*	City Employment	0.00263	$MTCO_2e$ per kWh	LGOP, PG&E
PG&E-Owned Streetlights*	City Employment	0.00263	$MTCO_2e$ per kWh	LGOP, PG&E
Water Electricity	Service Population	0.00263	$MTCO_2e$ per kWh	LGOP, PG&E
Employee Commute and Travel	City Employment	6,030	$MTCO_2e$	EMFAC 2011, LGOP
Tons Disposed	City Employment	13,700	$MTCO_2e$	CARB Landfill Tool

**Note that emissions coefficients vary for County electricity use because of multiple utility providers. County facilities are located within the incorporated cities of Gridley and Biggs, resulting in accounts serviced by these municipal utilities. PG&E provides service to most of the County's accounts.*

Forecast Indicators

Emissions are forecast to 2020 and 2030 using indicators. For example, the projected increase in households identified in the Butte County General Plan is used to estimate residential energy and off road emissions for 2020 and 2030. **Table B-5** identifies the various growth indicators used to forecast Butte County's community and government operations to 2020 and 2030.

Table B-5: 2020 and 2030 Emissions Forecast Indicators

Indicator	Source	Emissions Forecast Sector	2006	2020	2030	Percent Change, 2006–2030
Households	Butte County General Plan	Residential Energy, Off-Road (Lawn and Garden and Construction Equipment)	34,981	43,567	49,700	+42%
Population	Butte County General Plan	Used to calculate service population	89,406	104,161	114,700	+28%
Jobs	BCAG Transportation Model	Nonresidential energy, used to calculate service population	7,738	8,956	9,827	+27%
Service Population	Calculation (Population + Jobs)	Solid waste, water, wastewater,	97,144	113,117	124,527	+28%
VMT	BCAG Transportation Model	Transportation	464,302,660	567,121,185	677,283,969	+46%
County Government Building Area (sq ft)	Butte County Capital Improvements Budget, extrapolated to 2020 and 2030	Building energy	1,000,000	1,060,000	1,060,000	+6%
County Employees (FTE)	Butte County Budget Report, extrapolated to 2020 and 2030	Fleet, Lighting, Employee Commute and Travel, Government-Generated Solid Waste	2,270	2,460	2,600	+15%

State Reduction Methods Summary

Assembly Bill 1493 (Pavley) and Low Carbon Fuel Standard (LCFS)

GHG Quantification Assumptions:

CARB anticipates that the Pavley standards and the LCFS will collectively reduce GHG emissions from new California passenger vehicles by about 22% in 2012 and about 30% in 2016, while improving fuel efficiency and reducing motorists' costs.

The Pavley rules establish GHG emissions standards for two different groups of passenger vehicles: (1) passenger cars and light-duty trucks with test weights under 3,751 pounds loaded vehicle weight (LDT1); and (2) light-duty trucks with test weights between 3,751 pounds loaded vehicle weight and 8,500 pounds gross vehicle weight (LDT2). Medium-duty passenger vehicles (LDT3) between 8,500 and 10,000 pounds gross vehicle weight are included with manufacturers' LDT2 vehicles when determining compliance with California's GHG standards. For the purposes of this analysis, only vehicles up to 8,500 pounds were considered, since most LDT3 vehicles are commercial and therefore do not fall under the scope of the Pavley rules.

The LCFS calls for at least a 10% reduction in carbon intensity (the amount of carbon released during production and use) within California's transportation fuels by 2020. This analysis assumes that carbon intensities will be reduced by 10%.

GHG reductions from the Pavley and LCFS standards were calculated using EMFAC 2011 data for Butte County. EMFAC 2011 data includes the breakdown of vehicles by vehicle class and emissions factors per mile for each vehicle class. Emissions reductions per model year and vehicle class are applied to the County's transportation emissions and would result in an 11% decrease in transportation-related GHG emissions below baseline levels by 2020.

Total GHG Reductions:	**2020**	**2030**
Emissions Reduced ($MTCO_2e$)	-79,730	-115,610

GHG Quantification Sources:

California Air Resources Board. 2010. Clean Car Standards – Pavley, Assembly Bill 1493. http://www.arb.ca.gov/cc/ccms/ccms.htm.

———. 2010. Pavley I and Low Carbon Fuel Standard Postprocessor Version 1.0. http://www.arb.ca.gov/cc/sb375/tools/postprocessor.htm.

———. 2011. Emissions Factor 2011 Model Software. http://www.arb.ca.gov/msei/modeling.htm.

Renewables Portfolio Standard

GHG Quantification Assumptions:

California's RPS mandates that utility providers procure 33% of their energy from renewable sources by 2020. PG&E provides electricity in the unincorporated areas of Butte County, and approximately 11.7% of the utility's electricity came from qualified renewable sources in 2006. While PG&E has made significant strides to reach the 33% goal by 2020, the California Public Utilities Commission (CPUC) has indicated that energy providers are not likely to meet this target due to transmission and permitting issues that have proven to be significant barriers to the development of renewable energy. Considering these barriers, the calculation included in this

plan relies on a more realistic scenario modeled by the CPUC in its June 2009 RPS Implementation Analysis Report, stating that PG&E's renewable energy portfolio would reach 28% in 2020. This implementation analysis shows that by 2020, PG&E would be providing customers in Butte County approximately an additional 11.9% of their electricity from renewable sources compared to baseline 2006 conditions.

Total GHG Reductions:	**2020**	**2030**
Emissions Reduced ($MTCO_2e$)	-16,860	-26,420

GHG Quantification Sources:

California Public Utilities Commission. 2009. 33% Renewable Portfolios Standard Implementation Analysis Report. http://www.cpuc.ca.gov/NR/rdonlyres/1865C207-FEB5-43CF-99EB-A212B78467F6/0/33PercentRPSImplementationAnalysisInterimReport.pdf.

———. 2011. California Renewables Portfolio Standard. Sacramento. http://www.cpuc.ca.gov/PUC/energy/Renewables/index.htm.

California Building Code, Title 24

GHG Quantification Assumptions:

Title 24 of the California Code of Regulations provides building standards regulating how each new home and business is built in California. It includes requirements for the structural, plumbing, electrical, and mechanical systems of buildings, and for fire and life safety, energy conservation, green design, and accessibility in and around buildings. The 2010 triennial edition of Title 24 applies to all occupancies that applied for a building permit on or after January 1, 2011, and remains in effect until the effective date of the 2013 triennial edition. This CAP focuses on two sections of Title 24: Part 6, the California Energy Code; and Part 11, the California Green Building Standards Code, or CALGreen. These two sections require direct electricity, natural gas, and water savings for every new home or business built in California. Title 24 is a statewide standard applied at the local level by local agencies through project review.

The GHG emissions forecast incorporates the net energy benefit of new Title 24 requirements that did not exist in the baseline year. These estimates are based on CEC studies that compare each new update of Title 24 to its former version. The AB 32 Scoping Plan calls for ongoing updates to Title 24 that will yield regular increases in the mandatory energy and water savings for new construction. As such, the GHG emissions forecast also includes a conservative estimate of the energy reductions resulting from future updates of Title 24 based on historic growth. Past updates to Title 24 have resulted in equal, if not higher, increases in efficiency. The energy reductions quantified in the forecast from Part 6 Energy Code updates are based on the assumption that the updates to the code would yield regular decreases in the maximum allowable amount of energy used from new construction. The energy effects of 2008 Title 24 Standards for nonresidential alterations are modeled. Future updates to Title 24 standards for nonresidential alterations are not taken into consideration for lack of data and certainty.

Total Measure GHG Reductions:	**2020**	**2030**
Emissions Reduced ($MTCO_2e$)	-5,350	-18,050

GHG Quantification Sources:

California Energy Commission. 2007. Impact Analysis: 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings.

———. 2010. 2009 California Residential Appliance Saturation Study. Sacramento. http://www.energy.ca.gov/2010publications/CEC-200-2010-004/CEC-200-2010-004-ES.PD.

Local Accomplishments Quantification: Sources and Assumptions

This section summarizes data sources, assumptions, and performance metrics used to calculate GHG emissions reductions for local accomplishments already programmed or under way in Butte County. Together with state reductions, these local accomplishments contribute to the County's current progress toward 2020 reduction goals. The sources and metrics are cited below, relying primarily on (1) the County's GHG emissions inventory and forecast, (2) public data, and (3) government agency reports

Information on actual, or measured, 2012 data is highlighted below. This observed performance to date was used to determine estimates of new business-as-usual emissions forecasts, accounting for continued implementation. Credits for local accomplishments that have occurred after the baseline year of 2006 are credited relative to the County's 2020 and 2030 emissions forecast.

Technical Data for Quantified Local Accomplishments

EA1. Solar PV arrays (CSI and Butte College)

GHG Indicators and Assumptions:

	2012	2020	2030
	Estimated	Projected	
kW of completed or pending unincorporated solar PV projects	2,361	2,361	2,361
Total kW installed at Butte College	4,570	4,570	4,570
Butte County annual kWh per kW	1,362	1,362	1,362
Average annual kWh savings	9,439,700	9,439,700	9,439,700

GHG Reduction:

	2012	2020	2030
	Estimated	Projected	
Emissions reduction ($MTCO_2e$)	1,860	1,730	1,640

GHG Sources:

Go Solar California, California Solar Initiative. 2013. Current CSI Working Dataset. http://www.californiasolarstatistics.ca.gov/current_data_files/.

Meehan, Chris. July 5, 2011. Butte College generating more solar power than it uses. http://www.cleanenergyauthority.com/solar-energy-news/butte-college-spins-back-meter-with-solar-070511/.

PVWatts Calculator (Butte County Specific). 2013. http://rredc.nrel.gov/solar/calculators/pvwatts/version1/.

EA2. Reductions in crop residue burnings

GHG Indicators and Assumptions:

	2012	2020	2030
	Estimated	Projected	
Reduced agricultural residue burnt annually (tons)	480	480	480
Number of walnut and almond acres participating in program	37,490	37,490	37,490
Percent reduction in burnt residue	5%	5%	5%

GHG Reduction:

	2012	2020	2030
	Estimated	Projected	
Emissions reduction ($MTCO_2e$)	790	790	790

GHG Sources:

Butte County. 2007. 2006 Butte County Agricultural Crop Report.

California Air Resources Board. 2008 Greenhouse Gas Emissions Inventory: Agriculture and Forestry: Ag Residue Burned. http://www.arb.ca.gov/cc/inventory/data/data.htm.

EA4. Reductions in fertilizer and pesticide use, and conversion to less GHG-intensive crops

GHG Indicators and Assumptions:

	2012	2020	2030
	Estimated	Projected	
Reduced agricultural lime usage (tons)	2,700	2,700	2,700
Reduced agricultural urea usage (tons)	3,590	3,590	3,590
Reduced agricultural nitrogen usage (tons)	130	130	130
Reduction in land used for rice cultivation (acres)	10,630	10,630	10,630

GHG Reduction:

	2012	2020	2030
	Estimated	Projected	
Emissions Reduction ($MTCO_2e$)	15,880	15,880	15,880

GHG Sources:

Butte County. 2007. 2006 Butte County Agricultural Crop Report.

California Air Resources Board. 2008 Greenhouse Gas Emissions Inventory: Agriculture and Forestry: CH_4 from Harvested Rice Area, N_2O from Nitrogen Applied in Fertilizer. http://www.arb.ca.gov/cc/inventory/data/data.htm.

California Department of Food and Agriculture. 2010. Fertilizer Materials Tonnage Report. http://www.cdfa.ca.gov/is/ffldrs/Fertilizer_Tonnage.html.

EA5. Increased solid waste diversion rate (2006–2012)

GHG Indicators and Assumptions:

	2012	2020	2030
	Estimated	Projected	
Diversion rate	59%	59%	59%
Reduction in solid waste (tons)	4,850	4,850	4,850

GHG Reduction:

	Estimated	Projected	
Emissions reduction ($MTCO_2e$)	1,020	1,020	1,020

GHG Sources:

Personal communication with Bill Mannel: Waste Management Division Manager, Butte County Department of Public Works. May 16, 2013.

EA6. Landfill gas power plant

GHG Indicators and Assumptions:

	2012	2020	2030
	Estimated	Projected	
Size of power plant adjusted for operating capacity (megawatt)	1.72	1.72	1.72
Average annual kWh savings	15,067,200	15,067,200	15,067,200

GHG Reduction:

	2012	2020	2030
	Estimated	Projected	
Emissions reduction ($MTCO_2e$)	2,960	2,770	2,620

GHG Sources:

Ameresco Butte County LLC and Butte County. October 26, 2010. Amendment #4 to Landfill Gas Purchase Agreement (Neal Road Recycling and Waste Facility, Paradise, CA).

EA7. Annexations of land with residential and nonresidential energy use into incorporated areas

GHG Indicators and Assumptions:

	2012	2020	2030
	Estimated	Projected	
kWh per residential acre	N/A	3,338	3,442
Therms per residential acre	N/A	77	85
Propane use per residential acre	N/A	58	67
kWh per commercial/office/industrial acre	N/A	36,459	36,459
Therms per commercial/office/industrial acre	N/A	911	911
Agricultural $MTCO_2e$ per agricultural acre	N/A	0.7	0.7
Likely residential acres for annexation	N/A	167	445
Likely commercial/office/industrial acres for annexation	N/A	19	48
Likely agricultural acres for annexation	N/A	0	4,341

GHG Reduction:

	2012	2020	2030
	Estimated	Projected	
Emissions reduction ($MTCO_2e$)	0	440	4,240

GHG Sources:

County of Butte. 2010. Butte County General Plan Draft Environmental Impact Report.

———. 2012. Butte County General Plan 2030.

EA8. Increased proportion of multi-family units

GHG Indicators and Assumptions:

	2012	2020	2030
	Estimated	Projected	
kWh reduction from single-family residential to multi-family residential	6,750	6,256	5,655
Therm reduction from SFR to MFR	173	163	156
kWh reduction from increased MFR units	884,231	4,112,449	7,936,007
Therm reduction from increased MFR units	22,692	107,053	218,985

GHG Reduction:

	2012	2020	2030
	Estimated	Projected	
Emissions Reduction ($MTCO_2e$)	290	1,320	2,540

GHG Sources:

County of Butte. 2012. Butte County General Plan 2030.

KEMA, Inc. 2010. 2009 California Residential Appliance Saturation Study, Volume 2: Results. http://www.energy.ca.gov/appliances/rass/.

EA9. Complete streets ordinance

GHG Indicators and Assumptions:

	2012	2020	2030
	Estimated	Projected	
Percent of streets and intersections with traffic calming improvements	N/A	25%	25%
Intersection density (intersections per square mile)	N/A	40	40
Trip reduction (VMT)	N/A	14,745,420	17,609,210

GHG Reduction:

	2013	2020	2030
	Estimated	Projected	
Emissions Reduction ($MTCO_2e$)	N/A	6,150	6,750

GHG Sources:

CAPCOA. 2010. Quantifying Greenhouse Gas Mitigation Measures. http://capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf.

Fehr & Peers. June 14, 2013. Memorandum - Butte County Climate Action Plan: Transportation Measures VMT Reduction Estimates.

GHG Reduction Measure Quantification: Sources and Assumptions

This section summarizes data sources, assumptions, and performance metrics used to calculate GHG emissions reductions for the Butte County CAP. The sources and metrics are organized by measure and rely on four primary types of data and research: (1) the County's GHG emissions inventory and forecast, (2) government agency tools and reports, (3) case studies in similar jurisdictions, and (4) scholarly research.

The quantification approaches are consistent with guidance provided for development of a Qualified GHG Reduction Strategy. The baseline GHG inventory and forecast serve as the foundation for the quantification of the County's GHG reduction measures. Activity data from the inventory forms the basis of measure quantification, including VMT, kWh of electricity or therms of natural gas consumed, and tons of waste disposed. Activity data was combined with the performance targets and indicators identified by the County. The activity data and performance targets and indicators were used throughout the quantification process to calculate the emissions reduction benefit of each measure. This approach ensures that Butte County's GHG reductions are tied to the baseline and to future activities occurring within the county.

Common Emissions Factors

Table B-6 lists common emissions factors used to quantify emissions reductions in the CAP. Coefficients are for 2020 after existing state and local programs have been implemented. For example, the on-road transportation factor represents the emissions from vehicles in 2020 after the Pavley standards are implemented.

Table B-6: Common 2020 Emissions Factors

Applicability	Value	Unit	Source
On-Road Transportation with Pavley and LCFS implemented	0.00042	$MTCO_2e$ per mile driven (with Pavley)	EMFAC 2011
Electricity with RPS implemented	0.00018	$MTCO_2e$/kWh	General Plan EIR Appendix A
Natural Gas	0.0052	$MTCO_2e$/therm	LGOP v1.1
Propane	0.0056	$MTCO_2e$/lb of propane	LGOP v1.1
Solid Waste	0.21	$MTCO_2e$ per ton of solid waste	CARB Landfill Emissions Tool v1.3

Technical Data for Quantified Measures

EN1. Connect homeowners to financing and resources for retrofits.

Actions:

- Participate in a program to provide additional low-cost financing for energy retrofits in Butte County to supplement available rebates from programs such as Energy Upgrade California and the California Home Energy Retrofit Opportunity (HERO) program administered by the Western Riverside Council of Governments.
- Host booths at home fairs.
- Encourage home remodels or additions to achieve California Green Building Standards Code (CALGreen) compliance by promoting available financing programs such as Energy Upgrade California or other local rebate programs.
- Provide pamphlets on financing programs with permits.
- Partner with local contractors to promote retrofits in the low-income housing stock through weatherization programs

GHG Assumptions:

	2020	2030
Basic Energy Upgrade CA participation rate	15%	30%
Advanced Energy Upgrade CA participation rate	5%	12%
Basic Energy Upgrade CA participation rate	15%	30%
Advanced Energy Upgrade CA participation rate	5%	12%

GHG Reduction:

	2020	2030
Emissions reduction ($MTCO_2e$)	-3,200	-6,400

Performance Indicators:

	2020	2030
Participating households	4,920	10,340
Electricity reduction per participant (kWh)	-2,150	-2,060
Natural gas reduction per participant (Therm)	-50	-50

GHG Sources:

California Public Utilities Commission. Energy Upgrade California: Butte County. https://energyupgradeca.org/county/butte/about_overview.

US Census Bureau. 2010. American Community Survey 2006–2010, Data Table DP04: Selected Housing Characteristics.

EN2. Promote residential appliance upgrades.

Actions:

- Track the number of energy-efficient or smart-grid-integrated appliances installed in new development and major remodels through the County's permit tracking system.
- Promote ENERGY STAR or energy-efficient appliances with County outreach materials including existing home improvement programs, rebate programs, and program monitoring.

GHG Assumptions:

	2020	2030
Appliance upgrade participation rate	20%	35%
Appliance implementation rate	50%	65%
Appliance upgrade participation rate	20%	35%
Appliance implementation rate	50%	65%

GHG Reduction:

	2020	2030
Emissions reduction ($MTCO_2e$)	-1,560	-3,490

Performance Indicators:

	2020	2030
Participating households	3,940	6,900
Electricity reduction per participant (kWh)	-590	-760
Natural gas reduction per participant (therms)	-50	-70

GHG Sources:

Brown, Rich, Sam Borgeson, Jon Koomey, and Peter Biermayer. 2008. U.S. Building-Sector Energy Efficiency Potential.

KEMA, Inc. 2010. 2009 California Residential Appliance Saturation Study, Volume 2: Results. http://www.energy.ca.gov/appliances/rass/

EN3. Connect low-income homeowners to financing and resources for retrofits.

Actions:

- Work with nonprofits to identify highest opportunities for a successful low-income program.
- Encourage workforce training programs to provide free weatherization services to qualified households.
- Partner with workforce training programs such as Living Elements and Valley Contractors Exchange.
- Leverage federal funding for home improvements, such as Community Development Block Grants (CDBG), to improve the energy efficiency and livability of Butte County's lowest-income households.

GHG Assumptions:

	2020	2030
Low-income weatherization participation rate	10%	35%

GHG Reduction:

	2020	2030
Emissions reduction ($MTCO_2e$)	-300	-1,190

Performance Indicators:

	2020	2030
Number of participants	1,310	5,230
Electricity reduction (kWh, averaged across all homes)	-120	-120
Natural gas reduction (therms, averaged across all homes)	-30	-30
Propane reduction (gallons, averaged across all homes)	-100	-100

GHG Sources:

Bay Area Economics. 2009. County of Butte Housing Element Update, Housing Needs Assessment: Public Review Draft. http://www.buttegeneralplan.net/ebinder/2009/2009-03-26/ButteCo_HsgNeedsAssmt_3-18-09.pdf.

KEMA, Inc. 2010. 2009 California Residential Appliance Saturation Study, Volume 2: Results. http://www.energy.ca.gov/appliances/rass/.

US Census Bureau. 2010. 2006–2010 American Community Survey, Data Table B25040: House Heating Fuel.

EN4. Support retrofits in existing nonresidential uses with an emphasis on manufacturing facilities.

Actions:

- Develop a voluntary educational program and business inventory to identify energy- and cost-saving opportunities.
- Promote Property Assessed Clean Energy (PACE) financing in partnership with the local chambers of commerce, utilities, and local businesses.
- Partner with utilities and local business leaders to connect local businesses with advanced rebates and assistance for energy retrofits. For example, the County may collaborate with PG&E to map local high energy users and guide County outreach in collaboration with PG&E.
- Conduct an annual awards event to highlight local businesses completing retrofits and saving energy.

GHG Assumptions:

	2020	2030
Participation rate for retrocomissioning	25%	55%
Participation rate for retrofits	15%	25%

GHG Reduction:

	2020	2030
Emissions reduction ($MTCO_2e$)	-2,130	-4,130

Performance Indicators:

	2020	2030
Number of retrocomissioning and/or retrofit participants	80	170
Average electricity reduction (kWh)	-117,460	-107,850
Average natural gas reduction (therms)	-1,220	-1,100

GHG Sources:

Pacific Northwest National Laboratory. 2011. Advanced Energy Retrofit Guide: Office Buildings.
US Census Bureau. 2007. 2007 Economic Census, Data Table EC0700A1: All Sectors: Geographic Area Series: Economy-Wide Key Statistics.

EN5. Work with utility providers to encourage nonresidential appliance upgrades.

Actions:

- Track the number of energy-efficient or smart-grid-integrated appliances installed in new development and major nonresidential remodels through the County's permit tracking system.
- Work with third-party providers and utility companies to provide low- to no-cost rebates and incentives for nonresidential appliances and equipment.

GHG Assumptions:

	2020	2030
Participation rate	20%	35%
Utilization rate	40%	60%

GHG Reduction:

	2020	2030
Emissions reduction ($MTCO_2e$)	-620	-1,570

Performance Indicators:

	2020	2030
Participating businesses	30	60
Average electricity reduction per business (kWh)	-81,120	-121,690
Average natural gas reduction per business (therms)	-750	-1,120

GHG Sources:

Brown, Rich, Sam Borgeson, Jon Koomey, and Peter Biermayer. 2008. U.S. Building-Sector Energy Efficiency Potential.

County of Butte. 2010. Butte County General Plan Draft Environmental Impact Report.

Itron, Inc. 2007. California Commercial End-use Survey - Results Page. http://capabilities.itron.com/CeusWeb/Chart.aspx.

EN6. Promote energy-efficiency programs and streamline on-site solar PV installations for agricultural and food processing facilities to improve operations and profitability.

Actions:

- Partner with PG&E to develop a localized, energy-efficiency outreach effort for agricultural processing industries reflecting characteristics of local operations and available financing.
- Provide resources on rebates and financing for appliances and equipment upgrades through stakeholder outreach, including collaboration with utility companies such as PG&E.
- Connect third-party energy-efficiency providers to provide free to low-cost equipment to eligible businesses and large energy users.
- Adopt a solar energy overlay zone to simplify the installation of solar PV in non-prime farmland that would serve on-site agricultural and manufacturing uses. The overlay will expedite the development of solar PV in high opportunity areas while protecting prime farmland and other environmental resources. Solar PV would be limited to 5 acres or less per parcel, consistent with the Butte County Zoning Code.

GHG Assumptions:

	2020	2030
Percent of food processors participating in demand response	30%	50%
Percent of food processors participating in steam system efficiencies	65%	80%
Percent of food processors participating in electricity efficiency	75%	90%

GHG Reduction:

	2020	2030
Emissions reduction ($MTCO_2e$)	-70,770	-100,740

Performance Indicators:

	2020	2030
Number of food processors participating in an efficiency program	34	53
Average electricity reduction per efficiency participant (kWh)	-35,210	-47,060
Average natural gas reduction per efficiency participant (therms)	-5,120	-4,290
kW potential of solar panels on agricultural land	277,280	415,290

GHG Sources:

California Energy Commission. Project Fact Sheet: Infra Red Drying of Rice to Improve Energy Efficiency and Disinfestations. http://www.energy.ca.gov/process/agriculture/ag_pubs/INFRA_RED_DRYING_RICE.PDF.

County of Butte. 2010. Butte County General Plan Draft Environmental Impact Report.

———. 2012. Butte County General Plan 2030.

Glen Lewis Group, Environmental Energy Technologies Division and Lawrence Berkeley National Laboratory, University of California. 2007. Strategies to Increase California Food Processing Industry Demand Response Participation: A Scoping Study.

Kazama, Donald, Joseph Wang, and Tony Wong. 2004. Energy Efficiency Opportunities in California Food Processing Facilities. http://repository.tamu.edu/bitstream/handle/1969.1/87972/ESL-IE-08-05-04.pdf?sequence=1.

Pacific Gas and Electric Company. 2012. Unincorporated Butte County Non-Residential Energy Overview.

Renewable Resource Data Center, National Renewable Energy Laboratory. 2013. PVWatts Grid Data Calculator Version 2. http://www.nrel.gov/rredc/pvwatts/grid.html.

EN7. Encourage new nonresidential buildings to meet and exceed CALGreen standards for energy efficiency, water conservation, and passive design.

Actions:

- Update development checklists and provide guidelines to support optimal energy efficiency.
- Educate builders through working group meetings and CALGreen workshops.
- Partner with local building supply stores to promote cost-effective materials that would help achieve CALGreen Tier 1.
- Seek grants or external funding to reduce building permit costs for buildings that meet CALGreen Tier 1.
- Identify CALGreen Tier 1 or 2 standards as preferred mitigations for the environmental impacts of new nonresidential projects.
- Maintain voluntary CALGreen Tier 1 standards as an option for new buildings.

GHG Assumptions:

	2020	2030
Percent of new nonresidential buildings built to CALGreen Tier 1	12%	20%

GHG Reduction:

	2020	2030
Emissions reduction ($MTCO_2e$)	-20	-70

Performance Indicators:

	2020	2030
Total new nonresidential square feet	127,710	584,000

Electricity reductions per square foot (kWh)	-0.04	-0.05
Natural gas reductions per square foot (Therms)	-0.0022	-0.0025

GHG Sources:

California Air Pollution Control Officers Association. 2010. Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures.

EN8. Expand distributed generation, renewable energy systems for new residential development.

Actions:

- Encourage all new discretionary development projects consisting of more than 500 residential units to achieve zero net energy using solar PV and high-efficiency construction.
- Offer expedited processing for developers providing on-site solar, such as participants in the state's Homebuyer Solar Program.
- Encourage all new discretionary multi-family developments to offer solar options or provide off-site power purchase agreements, following the Homebuyer Solar Program.
- Encourage all new discretionary projects to include solar prewiring for PV.

GHG Assumptions:

	2020	**2030**
Average kWh eliminated through zero net energy house	5,618	3,979
Average therms eliminated through zero net energy house	149	149

GHG Reduction:

	2020	**2030**
Emissions reduction ($MTCO_2e$)	-1,640	-4,380

Performance Indicators:

	2020	**2030**
Number of new households in participating areas	900	2,950
Percent of all new households	13%	23%

GHG Sources:

N/A

EN9. Support distributed generation in new nonresidential development to reduce on-site energy use.

Actions:

- Adopt incentives to encourage distributed generation systems, targeting large projects most likely to benefit from on-site energy, including large nonresidential development greater than 10,000 square feet.

- Streamline administrative review process to determine exemptions.
- Offer expedited processing for developers providing on-site solar.
- Encourage new nonresidential development, subject to discretionary review, to prewire for solar PV systems and to maximize roof space to accommodate future rooftop solar installations.

GHG Assumptions:

	2020	2030
Percent of new nonresidential developments with on-site renewables	5%	10%
Average amount of demand to be met by on-site renewables	80%	100%

GHG Reduction:

	2020	2030
Emissions reduction ($MTCO_2e$)	-110	-530

Performance Indicators:

	2020	2030
Installed kW for new nonresidential development	440	2,250
Number of participating businesses	10	20

GHG Sources:

N/A

EN10. Encourage the voluntary installation of distributed generation, renewable energy systems throughout the county.

Actions:

- Revise the permit fee to reflect size of PV installation.
- Streamline the review and approval of solar PV panels through online permitting and easily accessible educational materials.

GHG Assumptions:

	2020	2030
Percent of existing (pre-2006) homes with solar panels installed after 2012	4%	10%
kW potential of PV systems at existing (pre-2006) nonresidential development	27,000	42,000

GHG Reduction:

	2020	2030
Emissions reduction ($MTCO_2e$)	-9,070	-15,430

Performance Indicators:

	2020	2030
Number of pre-2006 homes with solar panels	1,400	3,500
Size of average residential PV array (kW)	7	7
Total size of PV arrays installed on pre-2006 nonresidential buildings (kW)	27,000	42,000

GHG Sources:

Go Solar California, California Solar Initiative. May 21, 2013. Current CSI Working Dataset. http://www.californiasolarstatistics.ca.gov/current_data_files/.

Renewable Resource Data Center, National Renewable Energy Laboratory. 2013. PVWatts Grid Data Calculator Version 2. http://www.nrel.gov/rredc/pvwatts/grid.html.

F1. Expand the use of alternative and clean-fuel vehicles.

Actions:

- Support use of neighborhood electric vehicles, such as low-speed golf courts or other personal neighborhood electrical vehicles.
- Encourage new nonresidential buildings, subject to discretionary review, to provide electric vehicle prewiring or conduit.
- Update zoning provisions to encourage alternative fuel stations.

GHG Assumptions:

	2020	2030
Number of public EV charging stations	15	40
Percent of households with NEVs	2%	5%

GHG Reduction:

	2020	2030
Emissions Reduction ($MTCO_2e$)	-570	-1,540

Performance Indicators:

	2020	2030
Number of households with NEV	870	2,490
Reduction in car use per household with NEV (VMT)	-1,650	-1,730
Number of public EV charging stations	15	40

GHG Sources:

California Air Pollution Control Officers Association. 2010. Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures.

California Energy Commission. 2002. Demonstration of Neighborhood Electric Vehicles (NEVs). http://www.energy.ca.gov/reports/2002-08-28_600-02-020F.PDF.

ICLEI USA. 2010. Climate and Air Pollution Planning Assistant (CAPPA) 1.5.

US Department of Energy, Vehicle Technologies Office. Comparing Energy Costs per Mile for Electric and Gasoline Vehicles. https://www1.eere.energy.gov/vehiclesandfuels/avta/light_duty/fsev/fsev_gas_elec2.html.

F2. Coordinate with Butte County Air Quality Management District to adopt construction mitigation requirements for all construction projects.

Actions:

- Applicants for projects subject to discretionary review shall be encouraged to choose one of the following:
  - Reduce construction equipment idling to 3 minutes.
  - As practical, use clean or alternative fuel equipment.

GHG Assumptions:

	2020	2030
Maximum idling time for construction equipment (in minutes)	3	3

GHG Reduction:

	2020	2030
Emissions reduction ($MTCO_2e$)	-500	-500

Performance Indicators:

	2020	2030
Reduction in construction equipment idling time	40%	40%
Participation rate of construction equipment	50%	50%

GHG Sources:

California Air Resources Board. 2013. Heavy-Duty Vehicle Idling Emission Reduction Program. http://www.arb.ca.gov/msprog/truck-idling/truck-idling.htm.

US Environmental Protection Agency and North Central Texas Council of Governments. Idle Reduction. http://www.nctcog.org/trans/air/vehicles/tech/idle/.

F3. Implement programs and update standards for new residential development to support fuel efficiency in autos and lawn and garden equipment.

Actions:

- Encourage electric vehicle outlets on external walls or in garages in all new residential development, subject to discretionary review.
- Simplify electrical permitting processes for electric vehicle charging.

- Work with Butte County Air Quality Management District to provide an appliance trade-in program for residential lawn and garden equipment.

GHG Assumptions:

	2020	2030
Percent of lawn mowers traded in	20%	40%
Percent of leaf blowers traded in	20%	40%
Percent of new homes that will install and use electric vehicle charging stations	2%	5%

GHG Reduction:

	2020	2030
Emissions reduction ($MTCO_2e$)	-660	-2,800

Performance Indicators:

	2020	2030
Average reduction in fuel use per traded in piece of equipment (gallons)	8	8
Number of lawn mowers or leaf blowers traded in	4,210	9,590
Number of homes with an electric vehicle	140	650
Reduction in gasoline-powered car miles per house (VMT)	-13,170	-13,040

GHG Sources:

California Air Resources Board. OFFROAD 2007. http://www.arb.ca.gov/msei/categories.htm#offroad_motor_vehicles.

US Department of Energy, Vehicle Technologies Office. Comparing Energy Costs per Mile for Electric and Gasoline Vehicles. https://www1.eere.energy.gov/vehiclesandfuels/avta/light_duty/fsev/fsev_gas_elec2.html.

T1. Create a transportation demand management program for businesses throughout Butte County composed of requirements for employers with more than 50 employees (large employers) and voluntary actions for smaller employers.

Actions:

- Work in collaboration with BCAG and local chambers of commerce to promote TDM strategies.
- Develop guidelines for Butte County that recommend appropriate TDM strategies for local businesses.
- Develop an informational brochure highlighting employer-based TDM strategies with available programs and provide as outreach to local businesses.
- Encourage existing employers and small employers to participate in TDM.

- Create an annual survey to track employee commute trends for all participating businesses.
- Connect employers with regional transit resources and partners, working with partners such as Butte County Association of Governments (BCAG) and Butte Regional Transit.
- Provide facilities for carpooling and park and ride programs and facilities such as the park and ride lot adjacent to the Oroville Veterans Memorial Hall.

GHG Assumptions:

	2020	2030
Average reduction in annual VMT per participant	-13,350	-13,850

GHG Reduction:

	2020	2030
Emissions reduction ($MTCO_2e$)	-1,840	-2,020

Performance Indicators:

	2020	2030
Number of employees participating in TDM program	330	380

GHG Sources:

Fehr & Peers. June 14, 2013. Memorandum - Butte County Climate Action Plan: Transportation Measures VMT Reduction Estimates.

AG2. Reduce the amount of burned agricultural residue.

Actions:

- Support Butte County Air Quality Management District permitting efforts to reduce residue burn.
- Connect agricultural operators to cost-effective chipping or other group options for agricultural waste.
- Investigate interest and feasibility for development of centralized chipping programs in coordination with other green waste efforts at the Neal Road Recycling and Waste Facility.
- Encourage the processing of agricultural waste products into building materials and biofuels.

GHG Assumptions:

	2020	2030
Almond acreage harvested per year	19,981	19,981
Tons of almond residue burned per acre	1	1
Walnut acreage harvested per year	17,511	17,511
Tons of walnut residue burned per acre	1.2	1.2

GHG Reduction:

	2020	2030
Emissions reduction ($MTCO_2e$)	790	790

Performance Indicators:

	2020	2030
Reduced burnt agricultural residue (tons)	484	484

GHG Sources:

Butte County. 2007. 2006 Butte County Agricultural Crop Report.

California Air Resources Board. 2008 Greenhouse Gas Emissions Inventory: Agriculture and Forestry: Ag Residue Burned. http://www.arb.ca.gov/cc/inventory/data/data.htm.

AG3. Optimize the efficiency of water irrigation practices through clean, alternative irrigation energy sources.

Actions:

- Work with Butte County Air Quality Management District to review the success of the countywide pump amnesty program.
- Develop a local amnesty program to register all agricultural pumps throughout the county and support Butte County Air Quality Management District efforts.
- Promote rebate opportunities for solar PV-powered pump equipment through the Farm Bureau and with other agricultural partners.

GHG Assumptions:

	2020	2030
Percent of agricultural pumps converted to solar	25%	25%

GHG Reduction:

	2020	2030
Emissions reduction ($MTCO_2e$)	7,070	7,070

Performance Indicators:

	2020	2030
Number of pumps converted to solar power	120	120

GHG Sources:

California Air Resources Board. 2003. Fuel Consumption Methodologies for Agricultural Irrigation Engines (category 052-042-1200-0000). http://www.arb.ca.gov/ei/areasrc/FULLPDF/FULL1-1.pdf.

———. 2006. Rulemaking to Consider Proposed Amendments to the Stationary Diesel Engine Control Measure - Appendix D: Emission Inventory Methodology Agricultural Irrigation Pumps - Diesel. http://www.arb.ca.gov/regact/agen06/append.pdf.

AG4. Improve maintenance of agricultural vehicles to reduce fuel use.

Actions:

- Promote best practices in agricultural equipment maintenance.
- Collaborate with the Butte County Air Quality Management District to publicize rebates for improvements.
- Provide materials promoting the transition to consolidated farm equipment.

GHG Assumptions:

	2020	**2030**
Reductions from best management practices	5%	5%

GHG Reduction:

	2020	**2030**
Emissions reduction ($MTCO_2e$)	1,860	1,860

Performance Indicators:

	2020	**2030**
Percent of agricultural equipment participating	50%	50%

GHG Sources:

California Air Resources Board. OFFROAD 2007. http://www.arb.ca.gov/msei/categories.htm#offroad_motor_vehicles.

AG5. Implement best practices in fertilizer and pesticide use.

Actions:

- Collaborate with stakeholders to support the efficient use of fertilizer.

GHG Assumptions:

	2020	**2030**
Reduction in applied nitrogen from 2006 baseline	5%	5%

GHG Reduction:

	2020	2030
Emissions reduction ($MTCO_2e$)	4,660	4,660

Performance Indicators:

	2020	2030
Reduction in tons of applied nitrogen from 2012 levels	1,330	1,330

GHG Sources:

California Air Resources Board. 2008 Greenhouse Gas Emissions Inventory: Agriculture and Forestry: N_2O from Nitrogen Applied in Fertilizer. http://www.arb.ca.gov/cc/inventory/data/data.htm.

W1. Sustain a maximum practical methane capture rate at the Neal Road Recycling and Waste Facility.

Actions:

- Continue to monitor landfill gas emissions.
- Expand the collection system as needed to comply with provisions of the Landfill Methane Rule (AB32).
- Extend the long-term landfill gas purchase agreement as appropriate at the conclusion of the current agreement.
- Research and develop conversion technology that results in increased capture of methane associated with organic waste.

GHG Assumptions:

	2020	2030
Target methane capture rate	90%	90%

GHG Reduction:

	2020	2030
Emissions reduction ($MTCO_2e$)	-6,160	-6,720

Performance Indicators:

	2020	2030
Methane capture rate	90%	90%

GHG Sources:

Personal communication with Bill Mannel: Waste Management Division Manager, Butte County Department of Public Works. May 16, 2013.

California Air Resources Board. 2011. ARB Landfill Emissions Tool. http://www.arb.ca.gov/cc/protocols/localgov/localgov.htm.

W2. Adopt a countywide diversion rate target of 75%, consistent with state policy.

Actions:

- Adopt an ordinance identifying the 75% diversion rate target consistent with AB 341.
- Develop program with haulers to track large waste generators.
- Under a voluntary program, certify facilities that are achieving or exceeding 50% waste diversion to achieve a 75% diversion rate by 2020.
- Support local facilities and programs that result in additional diversion of organic waste.

GHG Assumptions:

	2020	2030
Target diversion rate	75%	75%

GHG Reduction:

	2020	2030
Emissions reduction ($MTCO_2e$)	-6,010	-6,720

Performance Indicators:

	2020	2030
Decreased landfill tonnage per service population	-0.25	-0.26
Reduction in landfilled tonnage	-28,570	-31,940

GHG Sources:

California Air Resources Board. 2011. ARB Landfill Emissions Tool. http://www.arb.ca.gov/cc/protocols/localgov/localgov.htm.

California Integrated Waste Management Board. 2006. Targeted Statewide Waste Characterization Study: Waste Disposal and Diversion.

CalRecycle. 1999. Solid Waste Characterization Database. http://www.calrecycle.ca.gov/WasteChar/rescomp.asp?J=429&SortBy=Disposal.CalRecycle report.

———. 2012. Disposal Reporting System. http://www.calrecycle.ca.gov/LGCentral/Reports /DRS/Destination/JurDspFa.aspx.

GO2. Improve operations with energy-efficient equipment.

Actions:

- Adopt a revised procurement manual with a policy that requires consideration of energy-efficient options such as ENERGY STAR products when purchasing new equipment.
- Reduce the number of computer network servers by upgrading to virtual servers.
- Install automatic thermostat controls on facilities to help regulate building temperatures for diverse users.
- Install other automatic sensors to eliminate unnecessary energy use in energy and lighting, using technologies such as plug loads, occupancy sensors, and timers.

GHG Assumptions:

	2020	2030
Percent of facilities to be retrofitted	30%	50%
Implementation rate	50%	80%

GHG Reduction:

	2020	2030
Emissions reduction ($MTCO_2e$)	-260	-680

Performance Indicators:

	2020	2030
Retrofitted square feet	300,000	500,000

GHG Sources:

Brown, Rich, Sam Borgeson, Jon Koomey, and Peter Biermayer. 2008. U.S. Building-Sector Energy Efficiency Potential.

Itron, Inc. 2007. California Commercial End-use Survey - Results Page. http://capabilities.itron.com/CeusWeb/Chart.aspx.

GO6. Reduce fuel use in the County fleet.

Actions:

- Track options for alternative fuel vehicles and equipment.
- Continue to review options through the Fleet Committee.
- Implement CARB standards with replacement of the County's heavy-duty diesel vehicles (>14,000 lb).

GHG Assumptions:

	2020	2030
Fleet average mpg	10.5	10.5

GHG Reduction:

	2020	2030
Emissions reduction ($MTCO_2e$)	-450	-1,040

Performance Indicators:

	2020	2030
Target fleet mpg average	12	15

GHG Sources:

Butte County Records.

Local Government Operations Protocol v1.1.

GO8. Construct new buildings to CALGreen Tier 1 standards.

Actions:

- In addition to meeting LEED Silver standards (or equivalent) as required by General Plan COS-P2.3, new County facilities exceeding 3,000 square feet will meet CALGreen Tier 1 standards for energy efficiency, a 15% improvement over minimum energy standards.

GHG Assumptions:

	2020	2030
kWh percent reduction from Tier 1	3.9%	3.9%
Therm percent reduction from Tier 1	9.9%	9.9%

GHG Reduction:

	2020	2030
Emissions reduction ($MTCO_2e$)	-10	-10

Performance Indicators:

	2020	2030
New square feet built to CALGreen Tier 1	60,000	60,000

GHG Sources:

California Air Pollution Control Officers Association. 2010. Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures.

GO9. Reduce methane emissions from the Neal Road Recycling and Waste Facility.

Actions:

- Set a goal to achieve a total methane capture rate of 90% at the Neal Road Recycling and Waste Facility.

GHG Assumptions:

	2020	2030
Methane emissions at 75% capture	15,950	17,560
Total methane emissions (fugitive and captured)	63,800	70,240

GHG Reduction:

	2020	2030
Emissions reduction ($MTCO_2e$)	-9,570	-10,540

Performance Indicators:

	2020	2030
Methane emissions at 90% capture	6,380	7,020

GHG Sources:

Personal communication with Bill Mannel: Waste Management Division Manager, Butte County Department of Public Works. May 16, 2013.

California Air Resources Board. 2011. ARB Landfill Emissions Tool. http://www.arb.ca.gov/cc/protocols/localgov/localgov.htm.

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